F. R. Fosberg

RECORD

Pun Rauriuri - Pun Kaalg
ridge, Waianae Mtns.
Makaha - Waianae Kai
March 31, 1935

Pun Kawiwi - Pun Kaala
ridge, Waianae Mts.
Makaha - Waianae Kai

March 31, 1935

Top 1200 m.

ape-ape 1100 m.

Saddle 740 m. lunch 780 m.

bottom 560 m.

Collection and Field Note Book

No. 4

(Apr. 21, 1934 - July 1, 1935)

(8658 - 10999)

... 2

Hawaiian Islands

* * *

BR/1750

F. R. Fosberg

Observations
(Mangarevan Exped.)
also
Coll. No. book

Collection numbers
10710 – 10999
and
localities for 8658 – 10709.

det. F. R. Fosberg
/
/

BR
175a

F. R. Fosberg

Observations
(Mangarevan Exped.)
also
Coll. No. book

Collection numbers
10710 – 10999
and
localities for 8658 – 10709.

1+2 1-place

Central Pacific Ocean
S. of Hawaii

1200 April 21, 1934

Fanning Island - Line Is.

Walked along inner beach from cable station northeast for about a mile or more. This brought us into a large patch of Tournefortia and Pisonia woods. Here we crossed over into the woods and out onto the outer shore, back along the outer shore about half way to the station, then across to the inner shore again, and back to station landing.

Along the inner shore was a scrub of Tournefortia Scaevola frutescens and Pandanus. Of course coconuts were everywhere here too. The Scaevola reached at least 4 m. in height. Coll. Pandanus hes.

In the real forest, the Tournefortia and Pisonia reached great size, up to 20 m. tall and [redacted] in the largest Pisonia specimens a meter thru [redacted] near the base. The Tournefortia

was flowering and fruiting abundantly, but the Pisonia showed no sign of fruit or flower. The Pisonia wood was very ~~tough~~ brittle and soft. It was quite moist in this forest. The open glades here, especially near the outer shore were covered with Boerhaavia and with a form, or perhaps 2 forms, of Heliotropium anomalum. One was white flowered, with only a small yellow throat, and very strong sweet odor. The other was yellow, shading to cream at the edges and with only a slight, but different odor. They had very narrow leaves, decidedly green, rather than silvery. Both forms grow side by side.
The Boerhaavia was remarkably uniform everywhere, having entire, large, elliptical leaves, bright green.
Lida fallax (?) was quite abundant here, too

B. tetrandra

The open spaces on both

sides between the woods and the station contained little but a scattered bunch grass of Leptums repens. This seems to assume many forms, perhaps due to differences in age and habitat.
Ponds of water had absolutely nothing growing in them, except possibly a microscopic green or blue-green alga.

Polypodium scolopendrium
Pandanus
Leptums repens
Cocos nucifera
Fleurya suderalis (?)
Boerhaavia
Pisonia grandis
Portulaca lutea
Cassytha filiformis
Lepidium Owaihiensio
Euphorbia hirta
Euphorbia prostrata
Phyllanthus niruri
Lida fallax
Tournefortia argentea
Heliotropium anomalum
Scaevola frutescens
Erigeron albidus
Vernonia cinerea

Coll. isopods under coral rocks near the cable station landing.
No. 1 spec.

Coll. nos. H. St. J. & F.R.F. 14106-14111.

1201 April 21-22, 1934
English Harbor, Fanning Island

Coll. a few weeds around the settlement.
Cyperus rotundus is very abundant.
The following cultivated plants are not recorded by Christophersen
Caladium bicolor
asplenium nidus
Cordyline terminalis
Crinum asiatica
Crinum
atamosco rosea
Ficus carica
Antigonon leptopus
Dianthus caryophyllus
Bauhinia (dying)
Clitorea ternatea
Pelargonium

Coll. nos. H. St. J. & F.R.F. 14114
F.R.F. 11000-11002

Mirabilis jalappa
Nothopanax sp.
Guettarda speciosa
Asparagus plumosa

Citrus (lime)
Citrus (lemon)
Althea rosea
Eugenia jambos (rose apple)
Cucurbita
Citrullus (Watermelon)
Cucumis melo (cantaloupe)
Ipomoea batatas
Lycopersicum esculentum
Spathodea campanulata
Gaillardia
Zinnia
Tagetes
~~Lycedactla moliflora~~
Cyntosperma chamissonis
Nephrolepis exaltata
Asparagus Sprengeri
Allamanda cathartica Hendersonii
Plumieria (yellow, white)
Brassica (mustard)

1202 April 22, 1934
Fanning Island
1 mi. S. of English Harbor.
Coconut plantation.
Coconut trees that have fallen down just keep on growing, assuming various contorted positions as:

If the head falls in the shade the plant dies. One tree, upright, was branched ¥ into three equal branches about 15 feet up. The branches were about 10 feet long, all bearing nuts.

Coll. nos. H. St. J. & F.R.F. 14112

1203 April 23, 1934
Fanning Island - Outer edge south of English Harbor.

Coconut plantation on coral shingle. Coll. isopods, millipeds and an earthworm under an ~~cultivated~~ introduced Guettarda tree(3) Coll. 2 insects(3) on a cocoanut tree among leaf bases, also landshells. Coll. landshells among bases of bunch grass below.

Beyond coconut plantation a scrub of Scaevola frutescens with a little Tournefortia. Scaevola here grows to 3-4 m. tall. The stones are small and have a very peculiar sculpturing. Coll. shells in decaying, insect eaten leaves on the coral shingle in this scrub.

Coll. nos. H.B.H.J. & F.R.F. 14115-14118

1204 April 25, 1934
Fanning Island - Vai Tepu

Flats of broken coral and shells covered with pools of brackish water. A blue green alga similar to Nostoc grows abundantly on the bottom. There is a scattering of bunches of Lepturus repens and here and there some rather scrubby Vesuvium (portulacastrum), in one place this was quite abundant. The only living animals were land crabs and hermit crabs, and under the coral pieces around the edge, under dead Ipomoea glaberima, were Isopods, land shells and Collembola, all of which I collected(4). ~~The~~ The side toward the inside of the lagoon was mostly coconut plantation while the outer side was Tournefortia scrub in places covered with Ipomoea glaberima which seemed to completely smother

out everything. On the inner side Heliotropium anomalum mixed with the bunch grass at the edges. Here the leaves were short and ob-lanceolate while back among the coconut trees they were long and lanceolate. Both the color and odor forms mentioned in #1200 were present, side by side in the halophytic habitat.

Coll. nos. H. H. J. & F. R. F. 14119-14122.

1205 May 7, 1934
Tahiti, Society Islands
Fautaua Valley below the falls.

Vegetation principally weeds, especially at the lower part. Very luxuriant.

The most abundant plants are Elephantopus sp., Hibiscus tiliaceus and Commelina nudiflora.

The assortment of weeds is somewhat the same as that in the wet lower parts of the Hawaiian Islands but the growth is much more luxuriant.

Coll. isopods under rocks #1205

Coll. nos. H. H. J. & F. R. F. 14123-14130

1706 May 9, 1934
Fautaua Valley ~~about the~~ on the trail from below the falls, up the side and above the falls. We went about 1 km. above the falls.

Most of the way was thru a vanilla plantation. The forest had been cleared off of a very steep slope and a few trees left. Coffea and Rothopanax were planted to make young straight shoots for the vanilla plants to climb over. The flowers have to be hand pollinated. The plantations are very weedy.

Above the plantation the forest becomes more native, very wet, but still lower forest. Collected a few plants but made no effort to get much. Coll. nos. H. St. John & F. R. Fosberg 14131-14151.

Coll. some snails ~~&~~ and insects. Gave the snails to Dr. Cook.

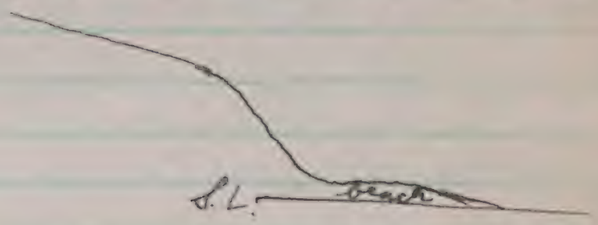
Ants living under the moss on a tree trunk, with a little system of galleries, but not cut in the bark at all.

Insect colls. ns. 6 + 7.

2=000000 in 1924 740-0 in 1933

1707 May 10, 1934
Matavai Bay, southeast of Papeete, Tahiti.
(Obs. for. Palmer.)

Along the shore of Matavai Bay, southeast of Papeete, the ridges are all truncate at their seaward ends.



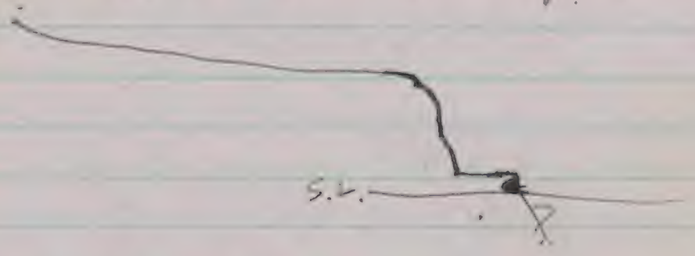
There is a strip of beach at the base, sometimes as much as 60 m. wide, of black sand, in some places, at least, mostly olivine. The steep part of the slope is perhaps 40-60 m. high.

The surface rock in the ridges is a soil, bright red in color, similar to that at Wahiawa or Kaimuki, Oahu. beneath this are layers of more or less weathered basalt. These are evidently successive flows with layers of a crumbly rubble. The solid layers are conspicuously columnar on cut edges.

1208 May 11, 1934
From the Leper colony, 7 mi. s.e. Papeete, around to Faarahi, Tahiti.

Near the Leper Colony two or three of the higher ridges have the truncate ends much steeper and a few blocks and stacks, 1-2 m. tall at the base.

Between Papenoo Valley and Tiarai Valley the ridges have the cliffs much steeper - in some places almost perpendicular - but not so high.

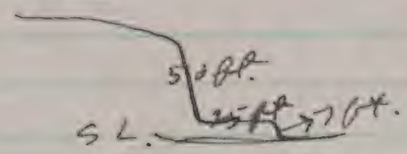


At the bases there were wave-cut benches like platforms 5-20 m. wide and ranging from the surface of the water, or awash, up to 2.5 m. The rock is a black basalt. Erosion by plucking or breaking out blocks,

and by undercutting, is very prominent. Chemical erosion very noticeable in pitting and rounding off of corners. I could not tell anything about erosion by abrasion or battering by wave thrown tools. Deep water immediately off shore

The prevailing wind is diagonal to the coast.

At Faarahi Valley, several km. further on were a few more ridges of this character and Dr. Lt. John photographed the bench at the foot of one.



1209 May 11, 1934

April Mauie Valley
Tahiti. 0-40 m. alt. 71

Very wet valley. Trees in the flor predstely huge "mape" ie Inocarpus edulis. Typical lowland vegetation, though of a very wet characth. Even leaf epiphytes (hepaticae) present. Many orchids growing epiphytically on the mossy trunks and branches of the trees on the steep, muddy side of the valley.

Coll. snails for Dr. Cook. One insect on the fern frond.

Coll. nos. H. St. John & F. R. Fosberg 14153 - 14177.

1210 May 12, 1934

~~Mehitea~~ Meetia, Society Is.
0-430 m. alt.

I did not go ashore, but rode around the island in the boat and took a number of pictures of it.

On three sides it is very steep, the other having a bench with a headcliff at the end.

The lower two-thirds was forested very heavily with Hibiscus tiliaceus, Pisonia sp., Casuarina equisetifolia, Ficus sp. etc. The upper part was covered with a tall coarse grass. One side had no forest being just loose rock slides.

Dr. St. John went ashore and collected about 70 sp. of plants. Dr. Cook collected snails and picked up a few isopods for me.

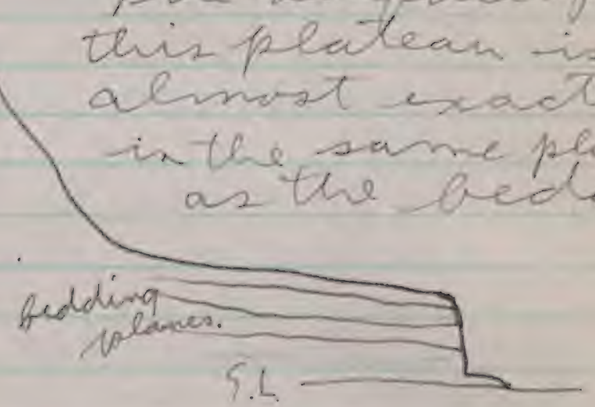
(over)

Coll. nos. H. St. J. 14180-14248

(Obs. for Dr. Palmer)

On one side of the island there is a bench with only a gentle slope at the foot of a steep slope.

The surface of this plateau is almost exactly in the same plane as the bedding



of the flows composing it, so it may be a part of the original surface of the island. At the foot of the outer cliff is a wave cut bench varying from sea level to 1 or 2 m. in height and 5-10 m. in width. There are many stacks and blocks surrounding it.

On another side the slope from the summit breaks off sharp and has a small low bench at the base.

1211 May 13, 1934
Anaa, Tuamotu Is.

I did not land. Dr. St. John landed and collected quite a few things.

The island is quite heavily forested.

Coll. nos. H. St. J. 14249-14309

1212 May 14, 1934
Katiu, Tuamotu Is.

We did not stop, but ran close along the west shore, lying to for a few minutes. A considerable stretch of the west side has been swept absolutely clean by a hurricane, not a scrap of vegetation being visible in about a mile, and appearing little by little at the ends. Here and there on this bare stretch are great boulders of coral rock, some weighing probably ten tons, lying loose on the reef. It must have taken a terrific storm to scatter these

around like that.
A shelving reef 20-30 m. wide stretched around the outside of this side. The outer edge of this was evidently a solid mass of a smooth, bright red nullipore alga.

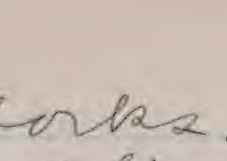
1713 May 15, 1934
Mapuka, Tuamotu Is.

Vegetation very scanty. I did not go ashore. Dr. St. John went ashore for a few minutes and collected a few things. He said that it seemed that a hurricane had cleaned things off at no very remote date.
The west side, at least, of this island is surrounded by a reef of nullipores similar to that on Katiu (#1212).

Coll. Nos. H. St. J. 14310-14319

1714 May 16, 1934
Tepoto, Tuamotu Is.

No lagoon on this small island. Some marshy places covered with Sesuvium portulacastrum. Island composed of broken coral, no raised reef present. These observations are Dr. St. John's, as I could not go ashore.
He brought aboard some Gouldia Romanzoffiana aboard and I made the following notes on it:
Plants growing on bare coral, forming small clumps, 2-4 dm. tall, more or less erect and bushy, with many dead stems. Plant herbaceous above, somewhat woody below. Leaves rather glossy, ~~[illegible]~~ stiff and fleshy, 1.5 mm thick, with pellucid veins.
Branching dichotomous with inflorescences

in the forks. Stems show a slight tendency toward squareness.
The inflorescence is a three flowered cyme with a pair of leaf like bracts subtending the pair of lateral flowers and another pair subtending the terminal one. These are represented on the lateral pedicels by two tiny pyramidal bractlets less than a milimeter long. These are sometimes on the terminal pedicel also in place of the bracts.
The buds are shaped like Kadua buds 
but with the tips of the outer part of the lobes not quite connivent, but with the inside quite truly valvate somewhat as in Houldia. Buds decidedly square when viewed from above.
Calyx lobes ~~obtuse~~, less than 1 mm. long, about 1 mm wide. Ovary in flower 3 m.m. long 3 mm. wide, round to decidedly flattened.

Corolla tube 5 mm. long, 2 mm. wide at base, 2.5 mm. wide at throat; lobes 4-5 mm. long, ovate, 2.5 mm. wide at base - acute with only a slight bump on the outside of the apex and a distinct appendage, somewhat blunt, backward pointing like the end of a bone crochet hook, about .5 mm long on the inside of the apex. anthers narrowly sagittate, 1.5 mm. long with a slight appendage at the apex. ~~No [illegible]~~. Pistil 4 mm. long (stigma 1.5 mm, style 2.5 mm) stigma with two connivent lobes, narrowly ovate acute. Lobes thickened & revolute all around. Lobes difficult to separate. Pistil deciduous with the corolla. Flowers not dimorphic. Corolla decidedly fleshy. No angle at the throat.
Fruits up to 2 cm. long and 2 cm. wide - spherical with flattened apex, depressed inside calyx lobes. Calyx lobes

scarcely apparent, only as tiny denticles. ~~Fruit~~ Corolla ring 5 mm. across. Epidermis purple, with white showing through. Fruit persistent gradually drying and changing dirty white becoming shriveled and obovate when dry. Dehiscing at apex when almost dry. Seeds angular, irregular, peltately attached.

In a fruit 18 mm - 2 cm. across the cells were 3 - 4 mm. thick. The seeds are black and loose in the ripe fruit.

Island here also surrounded, as far as I could see, with the same nullipore reef as on Katiu and Napuka.

Coll. nos. H. St. John 14370-14351

1215 May 17, 1934
Fangatau, Tuamotu Is.

Island surrounded by same sort of nullipore reef as on several last visited.

Heavily planted with coconuts, little forest visible other than coconuts.

1216 May 18-20, 1934
Hao, Tuamotu Is.

Island surrounded by same sort of nullipore reef as others visited.

Vegetation largely destroyed by hurricane of 1903-1906, especially on the north end. Some places still bare. Very little soil left anywhere. Coconuts planted most places. Dr. St. John collected nos. 14352-14426, including scraps of many recently int. cult. plants.

1217 May 21, 1934
Vahitahi, Tuamotu Is.

No one landed here. Little vegetation except coconuts visible. Opposite side of atoll from landing seemed practically bare from where we were. We could not see it very well.

Atoll surrounded by same sort of nullipore reef as those previously visited.

1218 May 22, 1934
South Marutea, Tuamotu Is.

Some areas here seemed like original forest of island, but the number of species was rather small. I did not go ashore. Dr. St. John collected nos. 14447-14448.

Reef surrounded by same sort of nullipore reef as those previously observed except that it seemed rougher here.

Gouldia tomanzoffiana here seems to have larger disc at summit of fruit than in other islands. On large fruits they were about 1 cm. across.

1219. May 23, 1934
Mangareva, Gambier Is.
As approached from sea.
and in general.

Island gives the impression of being very barren, dry and brush.

Practically all the slopes of the island, excepting perpendicular cliffs, are clothed with a coarse grass. Here and there in ravines a few trees are apparent. in certain places, evidently moist spots, large masses of forest of Aleurites and Hibiscus tiliaceus are present. On the south side, at the bases of great cliffs are some considerable patches of forest. On cliffs, bluffs and some gentler slopes a dark green vegetation of some kind is evident. (Lantana)

At the mouths of the canyons and ravines are plenty of coconut

trees, Mango trees, Hibiscus tiliaceus and other shore and cultivated trees.

On the south side there is a terrace at least 30 m. above the beach at the foot of Mt. Duff, and a series of four distinct terraces on the slope of Mt. Mokoto. The nature of these is not evident from the boat. I took some photos of them. The cliffs seem to be basaltic.

On the lower slopes on the Rikitea side there are considerable areas where Gleichenia linearis is competing successfully with the large, dominant grass - Miscanthus japonicus.

Stephen Garwood, resident for ten years, told me that every few years a fire completely burns over the island. This would explain very well the meagerness of the native flora.

Probably gravelly in eroded or formerly cultivated areas.

The terraces on Mokoto, seen from above, present all the appearances of wave cut terraces. They are much broader and flatter than is apparent from the ocean. The edges are a bit rounded off and the inner part at the base of the cliffs is piled with talus. I would like to have examined it more closely. D. Anderson thinks they may be the result of differences in the hardness of the beds. This is possible. As nearly as I can make out the main cliffs on Mokoto and Duff are the result of a fault. They are sheer and little weathered and in places 200 m. high. There seems to be no logical continuity between the front at the base and the cliffs themselves, except as a result of a slip of at least a couple of hundred meters.

1720 May 26, 1934
Rikitea, Mangareva, Gambier Is.

Collected cultivated plants and a few weeds around town, around the main street and the cathedral.

There is a large weed flora and a decidedly large flora of cultivated plants, mostly ornamental. Every house has a flower garden. The plants are practically all cultivated in the Hawaiian Islands also.

Many varieties of Codiaeum and several of Hibiscus are present.

Coll. nos. J. R. Forsberg 11003-11036.
11354 11037-11040
11044-11046
11048-11063

1721 May 28, 1934
Rouru Convent, Mangareva, Gambier Is.

Abandoned cult. fields & gardens.

Coll. Nos. J.R.F. 11041-11043 + 11047

1222 May 30, 1934
Pt. Kuhupiro, n. of Rikitea, Manga Reva, Gambier Is.

Collected plants along the rocky shore and the trail near the shore. Plants here mostly weeds. A few apparently native things left. The Miscanthus comes practically down to the shore on the ridges.

Coll. nos. F.R.F. 11064-11069

1223 June 1, 1934
Pass w. of Rikitea, Manga Reva

Went to top of pass and along the ridge to the base of Mt. Duff cliffs. On the bare rock ridge Portulaca lutea was abundant, also the queer Halorrhagis plant seen here & there before. On the edge of the forest at the base of the cliffs was a native fida. On the cliffs is nothing much but Diplazium and Polypodium scolo-

pendrium, some Lantana. I collected 10 or 12 plants of a queer Amaranthus. A large area of the grassland on both sides of the pass is Panicum instead of Miscanthus. It is green while the Miscanthus is brown.

Under moss on the ~~stone~~ rock ridge I collected 8 isopods, insects and millipeds.

1224 June 3
Gatavaki, Manga Reva

Followed most of the length of the stream in this valley, looking for shrimps (Atyidae) which a native said were there. Caught one small one, 5 mm & at least 7 cm long. Coll. Plectranocera sp. along stream. All grassland. Gleichenia grows & holds where landslides destroy grass. Garwood told me

1934 (Ed.)

that the Panicum comes back after fire much sooner than the Miscanthus.

There were eels in the stream. Perhaps they are responsible for the scarcity of shrimps.

Snails seemed the most abundant, almost the only form of animal life in the stream. Coll. a few and gave them to Dr. Cooke.

Coll. no. 7. K.F. 11106

1225 June 4, 1934
Pt. Teone Kura, 1 Manga Reva, Gamb.

Top of cliffs being dissected by erosion of the soft earth. Gleichenia in competition with Miscanthus, but, neither successfully protecting soil against erosion. Desmodium sp. abundant in cut gullies.

A patch of Lycopodium cernuum on one section of bluff not freshly eroded. It is mixed with Gleichenia. Seems to be

healthy enough. The natives use it to decorate hats and often transplant it to their gardens. They say that this patch is all that is left.

1226 June 4, 1934
Atitnita, 1 Manga Reva

Coll. lichens & hepatic on trunks of arborescens.
Coll. Eclipta alba in taro patch.

1227 June 4, 1934
2nd stream w. Atitnita Pt. 1 Manga Reva.

Coll. 2 sp. fresh water shrimps in stream. They live mostly in small pools in waterfall. A species of eel is in the streams and possibly feeds upon the shrimps. Not many of the natives seem to know about them. The large species

is semitransparent but ~~slaty~~ slate gray above. The antennae are brownish. The smaller species is semitransparent but ~~[illegible]~~ marked, particularly above with dark bluegreen.

Coll. freshwater shells in the stream and land shells on leaves of Miscanthus japonicus. ~~Also~~ Gave these to Dr. C.M. Cooke.

Coll. a few insects on leaves of Miscanthus

1278 ~~[illegible]~~ June 6, 1934

Vaiatekeua I., Gambier Is.

Island perhaps a kilometer long and 200 m. wide partially planted to coconuts, the rest mostly scrub of Suriana maritima, some bare broken coral, especially around the outer side. A very few Tournefortia trees, mixed with the Suriana. In one place on the inner beach a thicket of Pemphis acidula, one bush of it on outer beach. In open spaces much Triumfetta, Lepidium, + little Boerhaavia + Lepturus. Gouldia romanzoffiana around outer edge of s.e. part of Island, fairly plentiful. Plants present:

Cocos nucifera
Lepturus repens
Boerhaavia diffusa?
Hibiscus tiliaceus
Pandanus sp.
Triumfetta procumbens
Pemphis acidula
Suriana maritima
Ipomoea sp.
Tournefortia argentea
Gouldia Romanzoffiana

(Bottom of next page)

Island of broken coral, but with reef obviously raised? a few dm. and quite a few Pandanus

Scaevola frutescens abundant around outer ~~beach~~ and in open spaces in scrub, also on barren flats other

Cassytha is parasitic on almost everything.

1229 June 6, 1934
7th tiny islet s.e. Varatena, Gambier Is.

Coral islet, about 1/2 acre in area. Suriana scrub rather dense, with an open space in the center. 4 Pandanus trees. No coconuts.

Dr. Cooke found land shells on dead Pandanus leaves.

Plants present:

Pandanus sp.
Lepturus repens
Suriana maritima
Pemphis acidula
Triumfetta procumbens
Tournefortia argentea
Lepidium sp.
Scaevola frutescens
Cassytha filiformis

Islet merely a heap of coral fragments

Coll. nos. 7 B.T. 11197-11145

1229 (2d) Guettarda speciosa
Coll. nos. 7 B.T. Messerschmidia argentea
11146-11160 Scaevola frutescens
Crabeh (on dead twigs)
Lepidium sp.
Cassytha filiformis

1230 June 6, 1934
2nd islet n.w Taraumua I., Gambier Is.

Similar to #1229 but about 2 acres. Growth more open. Pemphis forms a large part of the scrub. In a low, new part of the islet, Pemphis is practically in pure stand and the rather young plants grow almost prostrate. In the older, higher part they are erect. There are many Pandanus and quite a few Tournefortias.

Plants present:

Pandanus sp.
Lepturus repens.
Lepidium sp.
Boerhaavia sp.
Suriana maritima
Pemphis acidula
Triumfetta procumbens
Tournefortia argentea
Scaevola frutescens
Vernonia cinerea
Cassytha filiformis

Coll. nos. 7 B.T. 11124-11136.

1230 a.

Gambier Is. – small islands visited by H. St. John but not by me.

1230 (b)

Manga Reva – Gambier Is.
Forest at base of cliffs of Mt. Mokoto, s. w. side.

Not visited by me, inf. from H. St. John + D. Anderson + E. C. Zimmerman.

Lower part of Hibiscus tiliaceus and aleurites, planted very intensively to coffee. Only a very narrow strip at the extreme base of the cliffs and up on the ledges as far as one can climb is native forest. This is the only real native forest left in the island.

Some of the plants were sterile, but most had either flower or fruit.

1231 June 13+14, 1934

Pitcairn Island

A high, rocky island, very well wooded, presenting a green and attractive appearance, contrary to the descriptions that I have read.

The littoral is very rocky and precipitous, there being scarcely a scrap of beach on the island. A peculiar condition prevails, in that saline conditions exist clear to the tops of the cliffs 100-200 m. above the water. The spray and great masses of foam are carried clear over the tops of the cliffs. The surf itself, I saw dashed at least 50 m. high. Decidedly littoral plants are found on the cliffs, such as asplenium obtusatum, Cyperus pennatus etc. At sea level the flora is rich enough in species but poor in individuals. The only plants abundant here are Asplenium obtusatum, Pisonia lutea, Lycium sandwicensis + Hibiscus tiliaceus. The other ordinary strand plants are mostly present but in very reduced numbers. For example, there are only 1 or 2 trees of Tournefortia on the island and I could find only a few stunted

plants of Scaevola frutescens. Pandanus is abundant from the ocean to the tops of the mountains, along the sea and inland.

In the town the plants are mostly introduced. Eugenia jambos is one of the most abundant in and back of Adamstown. ~~I~~ We collected most of the cultivated and introduced plants but missed at least the following:

Ficus sp. (a banyan)
Jacuca edulis
Brassica oleracea (Cabbage)
Barringtonia speciosa
Dolichos lablab (abundant) (lima bean)
Solanum tuberosum

Mimusops elengi
Citrullus vulgaris (watermelon)
Diospyros kaki (persimmon)
Citrus medica (citron)
Eugenia malaccensis (mountain apple)
Mangifera indica (mango)
Citrus grandis (pomelo)
Pouteria caimito (caimito)

The uplands are more or less rolling, with wide hanging valleys. Here are the cultivated plots of ground with small strips of forest between them as wind breaks. The chief cultivated crops are Manihot, Canna sp. (arrowroot) Ananas ~~sativus~~ comosus (pineapple) Vigna sinensis (as ground enricher) Dioscorea sp., Ipomoea batatas, Colocasia antiquorum, etc. Citrus aurantium grows abundantly, spontaneously, all

Lantana camara is very abundant almost everywhere.

over the island.

The forest is found in the wind breaks and on all the steeper slopes. The three dominant native things are an unidentified large tree, Metrosideros and Pandanus. Citrus aurantium and Eugenia jambos are very abundant. Ferns are abundant both in individuals & species.

The ridges are in places kept rather bare by the goats. In one or two places, at least, are very bad gulches, recently cut out and still in the process, due to the goats cleaning off the vegetation.

The cliffs have an interesting vegetation in addition to the littoral element mentioned above. Pandanus, of course is abundant. Canna indica(?) forms large patches here and there. Several ferns, apium(?) sp., Bidens sp. Euphorbia pitcairnensis, Procris(?) sp. and a number of other things are present.

4 ferns - Nephrolepis sp., Davallia solida, Dryopteris lentata and Polypodium scolopendrium are present almost everywhere. The latter presents an interesting series of variations.

The island is composed of several volcanic rocks. From the sea the cliffs seem mostly of beds of ash and tuffa with subsequent intrusions of basaltic(?) material. In the interior the soil and the few exposed rocks seem to be a much weathered basalt. Perhaps when the ash weathers it gives the same appearance as the soil produced by the weathering of basalt.

1732 June 17, 18-22, 1934
Henderson (Elizabeth) Island

An elevated coral island, approximately 5 miles across. It is practically level, about 30 m. in altitude, and surrounded almost completely by undercut cliffs rising directly from the ocean. At one place there is an anchorage and a beach a few hundred meters long and a level stretch back of the beach a few meters wide (10-50), this latter of coral and densely wooded. The woods on this low ground are mainly Thespesia populnea, Pisonia grandis, and Pandanus sp. There are a few coconuts here, evidently the only ones on the island. Pemphis acidula lines the beach, in some places becoming truly gigantic, a tree 8 m. tall and 4 dm. thru at base. Ferns and Peperomia sp. are very abundant beneath the trees. A few other shrubs and small trees

are present. It is quite damp.

On the coral cliffs Heliotropium anomalum and a Euphorbia very similar to E. pitcairnense almost exclude everything else

at the tops of the cliffs a low growth of Eugenia ramiflora and a form of Timonius(?) sp. are very abundant on the edge, and for a few feet back of this ~~Timonius sp.~~ and Pisonia grandis make a dense low growth.

Back of this is a somewhat more open growth of Pisonia grandis, Pandanus sp., Celtis, Canthium, Timonius(?) in a number of forms, Alyxia, Cassia sp., a Bidens 5 m. tall, Santalum Hendersonense, and a number of other trees and shrubs. Underneath is a tangle of Polypodium sps. & Nephrolepis sps. Davallia solida and Peperomia. ~~The Polyp~~ This extends back at least a half k.m. very dense in some places, thinner in others. The ground in some places is finely pulverized coral, — in others coarse broken coral, and in others the dissected, sharp, pitted raised coral rock known to the Polynesians as "makatea."

It is said that there are deposits of phosphate here. I did not see any evidences of it. ~~half a dozen~~

Here we found ~~to the~~ plants of Cordyline, which is, perhaps, with the ~~Cos~~ Cocos nucifera on the beach, the only plants introduced by man.

The Timonius(?) presents a maze of variations in leaf form, habit of plant, length and shape of corolla, size and shape of fruit and type of inflorescence. It will bear much investigating.

The Polypodiums, also, are variable. Ordinary P. scolopendrium seems to run right into P. Euryphyllum var.

I collected quite a series of these variations, here, as on Pitcairn.

Besides numerous sea birds - Frigate birds, Boobies, shearwaters, Boatswain

Sporobolus sp. makes tangles over this ground and on the edges of the cliffs.

The Cocos is said to have been planted by the Pitcairn islanders. This is likely, as the trees are all young.

Start 1:4 30

6/

birds, white terns, etc., ~~three~~ four land birds are present — a dove with a red crown, green wings and yellow green belly, the rest gray; the Tahitian parakeet or lorie; and a small flightless rail or similar running bird, about 1 or 1.5 dm. long, sooty with bright red legs! [and a bird like a creeper — body shaped more or less like a sparrow, bill long, color light gray to white except some of the wing + tail feathers. Habits like a nuthatch or creeper.]

→ A rat and a skink lizard were also noticed, the former rare and the latter abundant.

Toward the interior the forest didn't change much. The ground is somewhat lower, but the character of the forest was practically the same, perhaps a little wetter. Some epiphytes grew here — Cyclophorus, Davallia, Asplenium nidus (mostly on ground or rotting logs), mosses + lichens. Only the two latter grew epiphytically nearer the edge.

The soil is about the same as near the edge.

At one place there is an open stretch of half an acre of the most extremely dissected coral imagineable. It is cut into sharp pinnacles with deep holes and fissures between them. In some places

here there cracks up to 3 dm. wide and of unknown depth, running in irregular

May 7 → pattern criss-cross thru the coral. In the cracks and holes Peperomia sp. and Asplenium nidus grow down as far as one can see. On this and around the edges is a growth of Hernandia sp. — bushes 3 m. tall with bright red fleshy fruits and thick trunks and branches. We saw this nowhere else. Adjoining this was a considerable area of the same sort of substratum, covered with the regular forest of the island and with considerable humus in the fissures.

Korthalsella sp. seems to be limited to three hosts, and to assume a different form on each. A very vigorous, broad jointed form on Pisonia, a small very narrow jointed form on Celtis and an intermediate one on Glochidion(?) sp. These look very much like the Hawaiian plants.

The Pandanus here, as usual presents much variation in the fruit. In the same cone there are phalanges with very sharp pointed parts and ones with almost flat tops. Many of them seem to have abortive carpels at the sides of the phalanges. One thing in which they seem to agree is in having the basal leaves on a stem very short and the longest ones near the middle of the cluster. How they get this way is as yet a mystery to me. My coll. no. 11346 shows this. The old wood in the lower part of the trunk is extremely hard. The trees extend considerably above the rest of the forest, most of the leafy portions being above the general level. The portion above has a very conspicuous pyramidal or conical appearance.

Collected a couple of bags of humus for Dr. Cooke which had an extremely large number of small shells in it. One bag was under Pandanus. The other was under Pisonia and Glochidion(?) sp. Coll. a few insects and Isopoda at the same time and place. Also collected some insects under the loose bark of a small dead tree or shrub.

Coll. a number of snails and Isopods under leaves and dead Pandanus twigs down near the beach. There are at least two different isopods.

Further investigation of the small leaves of the Pandanus revealed that the series of small leaves alternate with series of large ones, evidently representing a season's growth. I did not see any buds here but this growth looks as if it came from leafy buds. It occurs on both sexes.

When leaving the island we saw that around the point from where we landed there is a long beach, perhaps a mile long, which we couldn't reach at all, because of the waves. There were more coconuts and at several places it looked possible to climb the cliffs. One coconut tree was on top of the cliffs. One or two trees on this beach did not look familiar at all. It looked as though there would be a much more complete strand flora here than where we landed. The vegetation on the tops of the cliffs was more sparse than on the cliffs which we investigated. at the northeast corner it seemed quite bare at the top. This side should be collected.

The reef around this island is predominantly coral, algae being present but secondary in quantity, no smooth-bed reef being formed here as in the Tuamotus.

1233 VI/23/34

Oeno Island

Flat coral island surrounded by a large reef. One end is of a tilted, bedded sandstone, the rest of the island is sand.

The dominant plant is Tournefortia argentea, some of the trees being very large, up to 1.5 m. in diameter and 10 m. tall. Most of the island is wooded heavily with Tournefortia, though in places it is reduced to a scrub with open spaces in it. In the open spaces Lepidium and Gouldia romanzoffiana are abundant. The Gouldia is variable as to size of leaf and most of the plants have very small fruits, less than 1.5 cm. through. Some have normal fruits. The height of the plants did not exceed 5-6 dm. Isolated bushes were round in shape. Suriana maritima was present around the edges; though not at all

Polypodium scolopendrium abundant under trees and some even in open, growing on sand.

abundant. Boerhaavia carpeted the ground in most places. It had unusually large flowers. The leaves varied greatly, but this is obviously of no systematic value, as many of the extremes were to be found on the same plant. The stems reached 2 m. in length, absolutely prostrate, except the fruiting branches.

At the extreme s.w. end Dr. St. John found a small patch of forest containing a ~~[illegible]~~ woody Bidens, Solanum viridis, Pisonia grandis and Asplenium nidus.

Cassytha was rare, though present. In some of the open places were great masses of low growing Achyranthes velutina. Lepturus repens was abundant in open spaces especially near the outer side, growing in bunches in the sand. Pandanus was abundant locally; some of the trees being enormous.

Coconut trees, none of them very old, were present near the hut put up by

the Pitcairn Islanders. The trees were bearing very heavily and the nuts were large and of good quality. This and a single plant each of Solanum nigrum and Crinum sp. were the only plants that did not appear indigenous. I exterminated the Crinum.

I saw several rats and am pretty ~~[illegible]~~ sure I saw a skink lizard.

The island is a paradise for birds. White faced boobies, Boatswain birds, Shearwaters and terns (white beneath, black above) were all nesting abundantly on the ground. Frigate birds were nesting in the trees. White terns were abundant. Blue faced boobies were seen. Young of all ages and eggs of the white faced boobies and Boatswain birds were present. All were practically fearless and the Boatswain birds would fight and scream if disturbed. I took a series of pictures

of Boatswain birds of various ages.

The most conspicuous animal excepting the birds was a large red hermit crab, the same as observed on Fanning and other islands.

Insects were abundant, including a moth which seemed to be laying eggs in the Gouldia and an ichneumon wasp which Zimmerman did not collect.

The reef here, as in Henderson seemed composed much more completely of coral than algae.

1 2 3 4 June 25, 1934

Tinoe Island

A atoll with a series of islets, mostly connected by a dry reef, or separated only by a very shallow channel

I thoroughly explored several of the western islets, which are less densely planted to coconuts than ~~most~~ the rest. The ~~vegetation~~ ~~collections~~ here ~~is~~ very different than on Reno.

The two most important plants are Pandanus sp. which forms an open woodland all over the island, and Scaevola frutescens which forms a dense mat of vegetation about 5-7 dm. thick. In open spaces here and there are Lepidium sp. Boerhaavia (sparse), Portulaca lutea, Gouldia Romanzoffiana. A few Tournefortia bushes are scattered here and there, but very few and very small. Around the edges Suriana maritima and Gouldia Romanzoffiana are abundant. On the dry reefs between the islets there is either nothing

Scaevola frutescens

at all a scattered tiny bushes of Pemphis acidula.

The peculiar vegetation here may possibly be due to a burning over when the coconuts were planted. Here and there are signs of fire. The coconuts are possibly 6 or 7 years old.

The soil is all broken coral mixed with coral sand.

The reef here possesses a definite Lithothamnion reef, though there is lots of coral in it. It seems particularly rich in marine life. I would like to come here and spend some time collecting marine things. I picked up a lot of marine ~~stuff~~ shells, washed up on the beach.

The Pandanus trees here have the same habit of small leaves alternating with large ones which I observed on Henderson & Ocno.

1235 June 26, 1934
Gatavake Valley at the base of cliffs of Mt. Duff. Manga Reva Gambier Is.

Forest of Hibiscus tiliaceus, aleurites, etc. Moist woods, without much under brush. Cyclosthrus and Davallia growing abundantly, epiphytically.
Coll. nos. 7.R.7. 11355 - 11358 + 11365 - 11366

1236 June 26, 1934
Mt. Duff. Manga Reva. Gambier Is.

Miscanthus is rather sparse on the ridges, probably due to goats. On rock outcrops which occur here and there, especially on top Davallia and Peperomia were abundant, along with many mosses and lichens. On ledges Lantana is abundant. Moisture oozes out of the crevices here and there.

The patch of forest a little below the top on the n.e. side is made up of Aleurites, Hibiscus tiliaceus and Sapindus, all tangled together with Lantana. Rather moist in dry weather.

Coll. Nos. 7.R.7. 11359-11364

1237 June 30, 1934

Rapa - from the sea and in general.

Very rugged, with steep slopes, sharp ridges and pinnacles in abundance. Very little level land. Deeply indented by bays. Presents the appearance of submergence.

From the summit of Mt. Taga - all ridges and ravines - no tablelands at all - at least .7 of the visible land is grassland. Forest in patches on the slopes.

Erosion scars here and there in the grasslands.

The land at the mouths and in the bottoms of valleys all cultivated - mostly taro. Tenaces also on lower slopes. Manihot and ananas cult. on very steep slopes. Taro also, but rarely - in holes about 2-3 dm. in diameter and 2 dm deep - on steep slopes.

It seems that the forest is more or less confined to the steepest slopes and the ravines and water courses. The rest is grassland, varying in

composition on the various parts of the island, or patches of Gleichenia linearis. The lower parts of the grassy slopes often become bog-like - not soft but ~~damp~~ wet and containing Vaccinium sp. Lycopodium cernuum and gleicheria.

The one constant and most abundant component of the grassland is Kyllinga brevifolia. This last paragraph ~~applies to~~ may not apply to the extreme south side of the island.

Notes on some of the abundant components of the vegetation:

Aleurites moluccana —

The most abundant tree below 150 m. alt. very little above that. Particularly abundant in ravines. Not a prominant part of the littoral vegetation.

Hibiscus tiliaceus —

The most abundant littoral plant. Only found in a few places above 30 m. Forms dense tangles

in the lower edges of the forests where the slope is not too steep near the shore.

Pandanus sp. —
Common, but not abundant along the shore, both in forests and on open shoreline. Scattered in forests up to 250 m, but not common. Very variable. Leaves vary in size and arrangement of spines. Fruits vary tremendously. It seems to mean very little, though, as there is a tremendous variation in cones on the same tree and fruits on the same cone. Also it would be almost impossible to delimit species without making many or single trees. P rapensis Brown is evidently represented by one tree. We didn't find it, but a native told Maireau that he knew of a tree.

Fittchia rapensis —
Common from 50 m. to 400 m. It grows in all patches of forest as a rather abundant component, usually in the

forest rather than out around the edges. The varieties seem rather weak.

Lautea Colenettei —
One of the most conspicuous and abundant trees from 50 m. to the top of Mt. Perahu, in all forests, most abundant at the upper edges of the patches. We proved Dr. Brown's L. serrata to be sucker shoots of the ordinary one, and I think that all his varieties are a lot of foolishness. They all look the same, varying within certain narrow limits in certain characters.

Freycinetia
Occasional at 200 m. and in most places forming the bulk of the vegetation from 400 to 600 m. In many places it forms pure stands, so dense and tangled as to look like a mat plastered against the steep slopes. In the rainforest on top of Perahu it is abundant but not dominant. No slope, as long as it is not vertical, seems too steep for it. Old fruit occasional.

(cont. p. 120)

Just starting to flower in many places, still with ripe fruit.

1238 June 30, 1934

The Watering Place and between there and Area, Aluei Bay, Rapa.

Raining

Collected along the shore and up to 15 or 20 meters on the steep slope above the beach. The forest comes right down to the beach, mostly Hibiscus tiliaceus, but including Pandanus sp., Hernandia ovigera var. Ktobezii, Metrosideros, and several other trees and shrubs, and great numbers of ferns. We observed about 15 species of ferns, collecting most of them. Many of them were very large.

This is a decidedly moist or even wet lower forest. A waterfall comes down here and there are seeps everywhere. The ground below is wet and muddy. Taro is cultivated on the flat ground, watered by the stream. In open spaces on the hill Miscanthus is present.

1239 July 1, 1934

Slope above Area, Rapa

0-150 m.

Lower 50 m. steep slope covered with ferns of several species. Scattered woods mostly Aleurites above that with some plots cleared and cultivated- Manihot, ~~P~~ananas etc. above 75 m. forest alternating with rock ledges and cliffs. This is mostly Aleurites below and mixed above. Above are Fitchia, Claoxylon, Celtis, Myoporum, Wenmannia, Aleurites, Metrosideros and one or two unidentified trees and shrubs. The forest is nowhere very dense and in places are open patches of grass. Dodonaea viscosa is occasional on the whole slope, preferring open places. 94 ferns small bushes and seems to be sterile at this season.

In the grassy open places Miscanthus is occasional, in places abundant. Most of the cover is composed

* Hemigrinetia extreme top of forest - 5 m. tall.

of unusually large tufts of Kyllinga brevifolia and several ferns.

In the forest is considerable undergrowth of ferns — Dryopteris, Nephrolepis etc.

The forest runs about half way up the mountain, to where the slope changes from very steep and broken by cliffs of basalt, to a gentle slope running to the top of the peak — Mt. Tagpa. I did not go above the forest.

A stream tumbles down a ravine. In the many waterfalls are a couple of large mosses. Dense brush and ferns fill the ravine. Glochidion sp. is one of the abundant shrubs.

Nest Pg 47

1240 July 1, 1934
Lower n w. slope Mt. Tepiahu, first patch of forest e. of Ahurei. 0-50 m.

Mixed forest mostly Aleurites and Hibiscus tiliaceus, the latter in tangled patches. Citrus aurantium, Musa sp. etc also abundant. The greater part of the forest is cleared out, all except the large trees and the steep slope is planted with Coffea arabica. This plantation is old, judging by the size of the trees - averaging over a dozen inches in diameter breast high. The underbrush is kept very well cleared out. In the ~~raised~~ raised part of the forest ferns are dense under Aleurites, but crowded out in the Hibiscus tangles.

At the foot of the basalt cliffs at the top of the forest are a number of very interesting native plants. The cliffs ooze water.

Below the forest the land is terraced and taro is cultivated. A small stream waters this.

1741 July 2, 1934
Same as II 1739 and below cliffs east of this.

Ravine filled with forest tangled with Freycinetia, dense, deep shade. Stream running down bottom.

Shrimps and a large eel in a pool at the top of a waterfall.

Ferns forming dense undergrowth everywhere, most dense in more or less open places.

Trees in forest mostly Aleurites, Celtis, Fitchia, Claoxylon and a large leafed unidentified species.

~~Hapalinop~~ Trichomanes on rocks in dense shade near stream.

Sclerotheca occasional in ravine.

Mucuna? tangled over everything. A small Ipomoea abundant, blue flowered, A large one rare - white flowered, entirely different from the related sea shore ones. No fruit seen.

Lantea found at base of cliff.

Veronica rapensis on

ledges and at top and bottom of cliff.

Carex Stokesii on cliff in seepy wet places, also very abundant along stream. ~~Microsorium~~

Miscanthus in open spaces ~~and~~ in forest and on cliff.

Basaltic rocks is the important rock here. In ~~contains~~ one of the ~~waterfalls~~ cascades in the ravine was an exposure of what appeared to be a breccia.

A few plants of Angiopteris were in the bottom of the ravine.

A Dryopteris closely resembling D. cyatheoides is the most abundant fern throughout this region. Many other species are present, however

1242 July 3, 1934
Same as #1241 but a little east.

Forest below cliffs, broken by cult. fields and coffee plantations.

A white Dianella in flower and young fruit on the ledges.

Coprosma assumes all sterile. many leaf forms on cliffs, 1^

Lantea Colonettei var. denticulata small tree at top of cliff. The fruits are tilobed at base when mature, much more so and grooved up the sides and wrinkled at the top when green. Most of fruits three celled. Looks in general just like var. primaevis as collected yesterday below the cliffs.

Gleichenia mostly low single stems, but in places forming tangles.

1243 July 3, 1934
Ridge east of #1242, up to prominent knob of rock.

Top mostly grass covered.

Cyclophorus abundant on perpendicular rock face of knob.

Forest on ahuei side up to almost the top.

Kadua ~~[illegible]~~ rapensis at top of cliffs at edge of forest. Typically a shrub, Kadua in appearance here, but D. & St. John reports it as a tree at base of cliffs. Leeds peltate-wedge shaped. ~~[illegible]~~ Stigma somewhat enlarged-bifid, but not divided clear to base of enlarged portion. Leaf forms slightly different on different plants.

Scirpus sp. (giant) in marshy glade in forest - up to 4 or 5 m. tall.

Ixonius sp. half dead.

Hornalanthus with 2-3-4 celled fruits on same tree, mostly 3 celled.

One or two bad erosion scars on ahuei side.

Valley on other side partly ~~[illegible]~~ grass - cultivated extensively below.

Good forest on n. side of ridge.

1244 July 4, 1934

Mt. Taga, Rapa — from near the Watering Place to the summit.

0 – 260 m.

Littoral vegetation, principally Hibiscus tiliaceus, Pandanus, Aleurites, Hernandia ovigera — with undergrowth of ferns — extending up to the edge of the cliffs and very steep slopes — perhaps 25 m. Above this for a hundred and fifty to 200 m. is a slope resembling in certain respects an open bog ~~[illegible]~~ in the Hawaiian Is. The flora, however, was very ~~[illegible]~~ scanty — Lycopodium cernuum, Gleichenia linearis, Vaccinium sp. Metrosideros (dwarfed - .5 m tall at most), Juncus vodosus (rare) and two or three unidentifiable sterile grasses. In the bottoms of gullies are strings of plants of Pteris decussata (?). Along the stream above the watering place is a strip of forest (aleurites). The soil is damp but not really wet. In many places, especially near the top, there ~~[illegible]~~ are erosion scars, mostly covered with lichens. Gleichenia seems to reclaim these first. The

gleichenia in the bog is very dwarfed, forming a carpet 1.5 dm. thick, but near the stream it becomes large, as much as 2 m. thick and in dense tangled masses.

Above and on both sides of this boggy area is grassland covered densely by two sterile grasses and Kyllinga brevifolia (which grows in large dense tufts) and with a scattering on the lower parts, of Miscanthus.

There is a patch of forest at the base of some cliffs near the summit. I only examined it near the base of the cliffs. Where the grassland comes to the cliffs I found Cerastium sp. (weed), Oxalis corniculata (?), Coeculus (sterile) and Olearia (?). Where the forest comes to the base of the cliffs Freycinetia forms, with its erect stems, a very dense growth, excluding everything else.) In the forest and on the cliffs are a few rather straggling tree ferns (Cyathea sp.) with white trunks.

Around the summit, Digitaria pruriens (?) is added to the grasses. Also on several outcrops

of basalt, forming very small perpendicular cliffs, not very damp - moist - was a dense growth of Hymenophyllum sp. and Elaphoglossum sp. also a few small plants of Lycopodium cernuum. The top is all grassland.

Took observations from the summit on all visible peaks of any importance to check the map. Also drew in - roughly - the ridges, patches of forest and cultivated areas which could be seen plainly and located with some degree of accuracy.

In the bog I collected a specimen of Rhynchagonis, the common lowland species, on gleichenia, quite far from any trees.

1245 July 5, 1934

S. side Ahuei Bay west of Ahuei, to marshes at head of Bay. Rapa.

(with E.C. Zimmerman)

Littoral vegetation very sparse here. A few scattered trees of Hibiscus tiliaceus and Pandanus, a few weeds and much of a sterile beach grass.

Where the lower part is not terraced for cultivation the gleichenia comes practically down to the shore. The lower slopes appear boggy and here and there Lycopodium cernuum and Vaccinium occur. Every bit of land that is capable of being terraced is either cultivated or shows evidence of it in the past. Commelina undiflora covers the levees and abandoned terraces. Near the head of the bay is a considerable patch of trees - mostly Oranges - some Melia azedarach, Aleurites, Cocos nucifera (bearing tiny nuts). This gives way above to a considerable strip of forest

which we did not investigate. There are some guavas scattered along the base of the hills here. The taro patches are largely abandoned around the head of the bay. They are overgrown with Commelina nudiflora and a giant species of Scirpus.

Water oozes out at the top of the beach practically everywhere on this side of the bay.

Near Maroa Pt. I noticed a small cyathea not more than 1.5 m. above sea level.

Much Sargassum is cast up on the beach. In it are thousands of amphipods. Hygida also occurs here among the rocks. I did not collect them.

Along the lower slopes just above the beach are bad erosion scars. The soil is a red, clayey, weathered lava.

1246 July 6, 1934
Mt. Oranga, Rapa

Grass covered on all sides excepting a strip of forest on the southeast slope. This is mainly Cyathea at the very top, then tangles of Freycinetia with a few Lautea Colenettei and a large tree composite. Some ferns as undergrowth. Below this it becomes almost pure Aleurites, with a little Celtis. This is all on an extremely steep slope and at the base of cliffs. Below it stringers out into a ravine with Aleurites, Celtis and a few other trees and a dense undergrowth of ferns. At the base of the cliffs is a considerable stand of Metrosideros.

The grassland is mostly Kyllinga brevifolia with some Miscanthus japonicus, especially down near the base, and some of a very small Scirpus (?).

The fortifications at the top are overgrown with Commelina nudiflora. Ipomoea sp. is common.

1247 July 6, 1934
Mts. Tepiahu and Tanga, Rafa.

The west ~~ridge~~ and south sides of Tepiahu are similar to Mt. Oranga (c. 1746) - grassland.

The saddle between them is grass with a few scattered trees of Lantea ~~Colonettai~~ colenettai and Dodonaea viscosa.

The tops of both peaks, especially Tepiahu are bare knobs of ~~basalt~~ with a few tiny Metrosideros shrubs and a few Cleania plants, a little grass on ledges.

I scarcely got down into the dense forest on the south side of Mt. Tanga and the saddle. The upper edge was almost entirely devoid of aleurites. ~~It was~~ It was about an equal mixture of Lantea, ~~Dodonaea~~, Metrosideros, and Eurya ~~with~~ and Freycinetia with some Canthium and Dodonaea. Lantea is the most abundant in most places. I do not know how it is lower down.

On the ~~other~~ north side of both mountains and the saddle between, the forest is quite dense. It

is largely made up of Aleurites with considerable Celtis and a scattering of other plants. It comes up to the base of the cliffs. A few straggling plants of Lantea, Celtis, Canthium and Dodonaea come above the cliffs. The slope below the cliffs is very steep in most places. It was rather dark when I came down this slope and there were a number of trees that seemed sterile and which I was unable to identify. Coffea arabica is quite ~~common~~ abundant in the forest and there are considerable areas of this steep slope planted to coffee. In these the trees are quite old and the undergrowth of ferns is kept cleared out.

Below this forest gradually merges with a thick growth of Hibiscus tiliaceus.

Star p945

I examined one cliff at about 275 m. which was a thick bed of scoria (?) overlain by a basalt flow. The scoria is ~~consolidated~~ consolidated but loosely packed.

1248 July 7, 1934

Ridge bet. Mt. ~~Tanga~~ Taga and Mt. Pukunia, Rapa

250 - 200 m.

Pukuntalitalai The fortified knob on the ridge bet. Mt. Taga and Mt. Vaiu, where the ridge to Mt. Pukunia branches off is the upper end of a considerable bed of what appears to be sedimentary rock, a breccia of irregular sized fragments up to one dm. or more in diameter, but mostly smaller than 2 cm. in diameter. They are angular and the matrix is rather fine grained. The rock, however is so weathered that a knife cuts it like cheese and it crumbles at the least provocation. Several different kinds of basalt make up the larger fragments. All is weathered soft. The weathered matrix is white and powdery.

The ridge runs 30° east of north to the first angle. This is perhaps 200 m. after the angle it runs 75 m. more to the east. From the angle the dip from the top is about

The bedding is not at all plain. It exists in thin beds.

15°. The bedding planes dip about 35° from the horizontal 75° east of north. Calculating roughly from this, I estimate the bed to be at least 50 m. in thickness. I think that probably the material at the upper end is resting on basalt rather close, ~~up~~ to, if not at ground level.

The material in the lower exposures is rather different from that above, in appearance at least. It is all cut up by dikes of basalt, which though ~~as~~ completely weathered as the sedimentary rock, do not erode away as fast.

At the lower end of the s. e. ridge of Mt. Pukunia are cliffs, at least 30 m. in height, of a bedded rock, very hard and only weathered at the edge toward the saddle and then not much. The dip seems about the same as that measured on the same ridge. It was not possible to measure it here with nothing but a compass. I am not sure that this is sedimentary

rock but it seems to be similar to what was in the bed described, but not weathered. It is overlain by ~~at least~~ about 200 m. of basalt. The whole thing may be a series of volcanic breccia and not sedimentary at all.

The ridge between here and the knob described is grassland much cut up by erosion scars.

Jul 8 In the cliffs of Mt. Taga very evident bedding is visible but the material seems to be just a lava with very large crystals of olivine and hornblende(?) in it.

Rock specimens 1 – 4

1249 July 8, 1934

S.E. ridge and summit of Mt. Pulaumia.

The ridge for most of its length is bare and rocky. In one or two places the forest touches the top and in one place there is a stretch of gleichenia linearis.

On the S.W. side of the ridge is considerable forest – aleurites and celtis at the very bottom, then mostly Lantea, Eurya, and Claoxylon gradually giving place to a pure stand of Freycinetia. At the top of the forest, 40 m ± below the summit, the Freycinetia forms a dense mat like growth, to 2 or 3 m. thick, plastered in patches onto the almost perpendicular slopes, on all sides.

On the N.E. side what forest there is is rather high up and is mostly Freycinetia, but in the lower part there is considerable Lantea and Sclerotheca.

On the bare, precipitous slopes of this side a depressed

form of Dryopteris Margaretae is abundant, forming pretty rosettes. Veronica rapensis, Acalypha rapensis and Lycopodium are shrubs, scattered here and there.

The extreme summit is a knob of basalt with very little vegetation — Plantago rapensis in crevices and not at all abundant and a number of weeds which are abundant all the way to the top. Most conspicuous are Kyllinga brevifolia, Verbena bonariensis and a small leaved, shrubby Sida — probably a form of S. rhombifolia.

Leiopus nodosus grows almost to the summit.

1750 July 9, 1934

Low slopes at the head of Aguirre Bay - foot of Mt. Ruatara, Rapa. alt. 1 — 60 m.

Rolling bog-like land covered by a thin growth of Gleichenia linearis — a small plants 1-3 dm. tall. Here and there are colonies of Lycopodium cernuum. Vaccinium is scattered here and there. The spaces between the Gleichenia are covered by moss. The earth is wet, but firm.

Pteris sp. is scattered in the bottoms of the ravines. Sometimes there is a trickle of water in these bottoms.

Leiopus nodosus is abundant but in scattered tufts.

1251 July 9, 1934

Base of steep slope above #1250 and the steeper part of the slope. 200–250 m. alt.

Just above #1250 is a small patch of Aleurites with a few other trees and some coffee ~~and two of these~~. Nothing much here. I collected a few snails for Dr. Cooke under a coffee tree. Under the bark of a small dead Aleurites was a colony of Embudae. There were all stages of individuals from small larvae to adults. The galleries were silk lined. The animals back up rapidly when disturbed. Collected several individuals.

Above this ~~area~~ is a flat natural terrace covered densely by ferns – Dryopteris, Nephrolepis ~~and~~ gleichenia and Histiopteris. This is quite wet in places and scattered with large boulders. Near the foot of the cliffs is a patch of moist forest, a hundred meters long and stretching beside the waterfall to above the top of the cliff.

The trees at the base (T. Meteorsideros) are mostly Aleurites, a few Celtis, Eurya, Pittosporum? and considerable Coprosma. Here and there are small coffee plantations. There is a dense undergrowth of ferns in the forest: Asplenium, Campium, Dryopteris. A few specimens of Angiopteris are here and there in the dense part of the forest.

Coprosma, Eurya ~~and~~ Pittosporum and Celtis are abundant on the cliffs. Cyathea and Hemolanthus appear near the top.

The forest extends in the ravine above for a little way. On the cliff the forest is mainly on the south side of the stream. In the stream itself, on the ledges, Pilea ~~grows~~ grows, but in inaccessible places.

The cliffs north of the stream, above a few perpendicular granite bluffs are very steep, grassy slopes – Hyptinga + Saipus?

1252 July 9, 1934
Tapini Islet, in Aburei Bay, Rapa.

A conical heap of blocks of a plutonic rock rather high in dark minerals, with some felspar and evidently considerable quartz. On the east side is quite a bit of soil and here the vegetation is mainly grassland with Leipus nodosus, Paspalum orbiculare (most abundant), Dianella, Ageratum, Erigeron albidus, Cyperus pennatus, and Cordyline fruticosa.

On the west side there is scarcely any soil, just great blocks of stone. Here, however, is considerable ~~[illegible]~~ forest of Aleurites and a little Celtis. Undergrowth of Gleichenia.

Psidium is everywhere.

Pseudomorus is right above the waterline on the west shore.

Senecio Stokesii is right near the water on the ~~[illegible]~~ southwest corner. The forest extends most of the way around along the shore.

A list of the plants seen follows.

Dodonaea viscosa, Cyperus pennatus, Paspalum orbiculare, Gleichenia linearis, Polypodium scolopendrium, Nephrolepis biserrata var. subserrugirea, Dianella sp.; Peperomia sp., Ageratum conyzoides, Histiopteris incisa, Aleurites moluccana, Asplenium sp., Davallia solida, Erigeron albidus, Celtis sp., Senecio Stokesii, Psidium guajava, Blechnum orientale, Pseudomorus sp., Ipomoea sp., ~~[illegible]~~ Leipus nodosus, Dioscorea sp., Ananas comosus.

The blocks of rock show excellent examples of lapies. They were on rock faces at all angles, but the grooves and ridges all ran in a direction perpendicular to the ground except on horizontal or nearly horizontal surfaces where they form a maze. Some of the grooves ~~[illegible]~~ are over 1 dm. wide and at times they reach 3 dm. in depth. When the top of the rock is flat or nearly so, the vertical

grooves are continuous with the horizontal ones. One rock seemed to show the origin. A pitted surface seemed to show the beginning of grooves. The rocks were of a plutonic type. This type of weathering seemed to occur mostly on the north and ~~e~~ west sides of the island. on the south side the boulders were rounded by exfoliation. Large plates were scattered around on the ground. I took a number of photos of it.

1253 July 11, 1934
Maitua, cliffs at base of Mt. Tautautu, Rapa.
160 - 220 m.

Back of ahurei there is grass on the lower rounded slopes. In the ravines are bananas, Canna and Hedychium. Taro patches are in every place that can be terraced and watered. The head of the valley is a considerable low plateau, which is forested, chiefly with Aleurites, and much cleared and planted to coffee. Between the coffee plots are small areas of Aleurites, with Glaoxylon, Fitchia, Celtis, Freycinetia etc. laced with considerable Mucuna. There is a dense undergrowth of ferns, Piper excelsum, Pomoea of two species are abundant.

At the base of the cliffs ~~is~~ is an old talus slope, broken down into soil and densely forested. Boehmeria, Celtis, Coprosma, Aleurites, Piper excelsum and Freycinetia. Ferns of several species form

a dense undergrowth. The Freycinetia in places forms almost a pure stand.

In a ravine where there are many Boehmeria trees and rather little undergrowth, I found a colony of Balanophora, apparently on the roots of the Boehmeria. The plants were half exposed. One was in flower. I dug them up and tried to trace the roots back to the tree. All were on one root system and the main root went back under the nearest Boehmeria tree. Following it I found that it was not connected with this tree but went under it and on up the slope to another Boehmeria about 2 m. ~~up~~ above. It went under this one and on up the slope a little, then straight into the side of the ravine. I dug in about 1 m. and gave it up. The wood of the root resembled Mucuna more than any other thing in the neighborhood. It also dripped water as the Mucuna does. Millipeds were very

abundant, eating decayed portions of the Balanophora.

On the ledges of the cliff and in crevices two species of Coprosma were abundant, also Acalypha rapensis and a small sterile plant with square stems and opposite leaves. Water seeped out here and there on the cliff. Plantago rapensis is here but rare and sterile.

1754 July 12, 1934
Mt. Tepiahu, n. slope, above ± 1240 and east of ± 1240, Rapa
100 - 150 m. alt.

Grass lands above the cliffs, with a few strips of forest. At the edge of the cliffs below the grassland there are few shrubs and they are practically all Metrosideros.

The strips of forest are mainly dicrites with some Celtis, Glochidion, Coffea etc. Mucuna climbs over all.

The main forest running from

the saddle bet. Mt. Tepiahu and Mt. Tanoa, down to the sea, described somewhat in II 247, is chiefly of Aleurites up to ~~about~~ my highest altitude today. With it are Celtis, Homalanthus, Piper, Coprosma(?) and one or two unidentified trees, also what appears to be a huge tree Bidens. The natives have cleared out large parts of this for coffee plantations.

This forest is quite interesting it contains quite a number of trees not noticed elsewhere and at the top merges into a Lantea-Freycinetia-Eurya ~~community~~ community and at the bottom it merges into almost pure Hibiscus tiliaceus of the littoral. The coffee is cult. everywhere, from top to bottom and has gone wild where it is not cultivated. Wherever there has been any disturbance Commelina nudiflora has practically taken possession and driven out other undergrowth. This is generally true for the parts of the island that I have visited, both grass and forest.

In ravines in the grassland and near the edge of the forest Miscanthus reaches a large size and dense growth.

1755 July 13, 1934

Forests & ridges at head of Anama Valley, & small peak at head of Anama Valley, in ~~the~~ angle of ridge between Mt. Pukutaketake and Mt. Perahu.

Alt. about 300 m.

~~Main~~ Moist part of ridge.

The actual head of the valley is mainly grass covered, with a few living patches of forest, mostly Cyathea.

The ridge running from ~~the base of~~ this peak to the base of the southeast ridge of Mt. Perahu is peculiar. It is the upper edge of a basalt dike slanted at about 45° and broken off square. The basalt cleaves into prisms running perpendicular to the broken off end, and thus on one side the surface is perfectly smooth, while the other side presents a surface of thousands of little rounded points or bumps.

On both sides of this ridge are alternate strips of forest and grass land corresponding to the ravines

and ridges. Only the lower part of these forests is Aleurites. Upward they are very rich in species of trees and ferns. The broader strips contain much Freycinetia excepting on the edges, but there are many other trees in the Freycinetia. Cyathea, Kemitelia, 2 species of Glochidion Celtis, Euya, Myoporum, Lantea, Metrosideros, Fitchia and another tree composite, two unidentified Rubiaceae, Allophyllus, and a number of ferns. Styphelia is present on the rocky part of the ridge.

Both of Brown's varieties of Fitchia seem to be present and the more I see of them the weaker they seem to be as varieties.

Asplenium Gaudichaudii and A. adiantoides seem to be distinct, but whether as species or not I couldn't tell as yet.

I drew in the ridges, streams and forests of most of the head of the bay from the top of the peaks.

1256 July 15, 1934
Pupu Point, Maomao Pt. & Matauri Pt.
Foot of Mt. Tanga, mouth of Aharei Bay, Rapa. 1-5 m. alt.

Collected along the rocky shore here.

Miscanthus japonicus grows luxuriantly from the forest down to the rocks of the shore. Near Matauri Pt. the forest comes down to the edge of the water, but from here around the slope of Mt. Tanga it retreats higher and higher. In the Miscanthus are strips of Paspalum orbiculare?) which cover talus of large boulders. An occasional tree of some of the forest species, such as Aleurites, Homolanthus etc. is isolated in a ravine in the grass. The shrubs just above the shore are scattered bushes of Alyxia, Canthium and Hibiscus tiliaceus.

Scirpus nodosus, Eleocharis, Lepium sandwicense, Apium(?) sp. Cardamine, Asplenium obtusatum and Brassica oleracea (kale) as well as other weeds are just above high water mark. Acalypha rapensis is on cliffs. A beach grass (Paspalum?) is abundant below high tide marks, but sterile.

1257 July 16, 1934
s. slope Mt. Tepialin, Rapa
150 m. alt.

Western end of slope is mainly grass with strips of bush and woods along ravines and at the bases of small cliffs. This is mainly Fitchia and Metrosideros, with Aleurites lower down, some Cyathea, Acalypha, Coprosma and an unidentified Rubiaceae. Pseudomorus is present as a small shrub, chiefly on fern covered talus slopes. The Acalypha seems intermediate between A. Stokesii and A. rapensis. I think that the latter is merely a form of the former, growing in exposed situations.

The small talus slopes at the foot of the cliffs are mostly covered with ferns- Asplenium, Dryopteris (2 sp.), Davallia, Loxoscaphe, Adiantum etc. Some of these, the Dryopteris in particular, line small ravines in the grassy slopes.

1258 July 18, 1934
Palai Ridge, above Ahurei, Rapa.

Grassy, but in ravine toward Maitua there is a small forst, Aleurites below and a sterile tree resembling Ficus above. Angiopteris present above. Many ferns in undergrowth and around edges.

1259 July 1, 1934
Maungaaiai Ridge, from top of Palai to Mitiperu, Rapa

Grassy and fern covered below, forested, chiefly with Freycinetia above. A mixture of Cautea, Pittosporum, Eurya, etc. mixed with the Freycinetia, espaciallly along the crest of the ridge.

Bare or somewhat grassy covered with gleichenia at the top.

In rather tall ferns just below the forest, I found a different species of asplenium (Diplazium). It formed a considerable part of the fern

population for a very short stretch not so far seen elsewhere.

In an opening in the forest I collected a form of Pteris decussata with broad fronds with revolute or convex pinnae and very heavy fertile fronds. It was growing side by side with the normal form, a small area of it, and not intergrading at all. I saw it later, similarly on Kaukauanoo, on an open ridge.

Mostly weeds and goat trails on the summit, but down on the ridge to Kaukauanoo is a rich forest. It is mostly Freycinetia, but with Bidens, Lantea, Allophyllus etc. mixed in. It is quite damp, almost a rain forest. A number of epiphytes were abundant.

1760 July 18, 1934

E. ridge of Mangaoa, Rapa.

Sharp bare ridge, precipitous on one side and steep on the other, leading up to a tall knob of rock on top. Vegetation mostly grass and weeds. On the cliff side were a few ferns and stunted Metrosideros ~~trees~~ subshrubs, Kadua, ~~etc.~~ the supposed Elaeocarpaceous shrub (steik) etc. The knob on top is mostly covered by stunted Metrosideros and weeds. The steep side is grassy but with a couple of patches of open, damp Cunonia woods coming up to the edge.

1261 July 18, 1934

Kaukauamoo and east to the first small peak east of Teurgalele, Rapa.

Continuation of same forest as on Mitipeu up almost to top on west ridge. This continued along the south side of the ridge becoming more broken to the east. No forest on the n. slope east of Kaukauamoo except small patches in ravines. in one of these near the summit of Kaukauamoo was a single erect, stout shrub of Freycinetia.

Asplenium horridum was fairly abundant in the dense fern growth in these patches of forest.

Lower Anatauni valley on this side is practically all grass, except small strings of Aleurites & Hibiscus tiliaceus in the ravines. Around the two patches in the bottom of the valley Hibiscus til. and Citrus aurantium are abundant.

1262 July 13, 1934

Mairi, Rapa

Observed from top of Mangava and Mitipeu. The whole valley is covered by a solid jungle, except the cliffs which surround it on two sides. This is pure Freycinetia except for occasional cyathea and strings of Metrosideros, also a few Aleurites low down in the ravines. No cultivation here.

Of course possibly other plants existed which were not observable from above.

1263 July 20, 1934

Head of Hiri Valley, Rapa. 100 - 1240 m. alt.

Ridge between Teraitaha and Morongata mostly grassy, in places fern covered and in one spot the forests on both sides reach the ridge.

Practically the whole of the head part of Hiri

valley is forested excepting the lower slopes of Tevautahu and Tautautu and Pukumanu. The Morongota portion is densely forested.

The slopes here are very steep and rather damp. In some places Freycinetia is very dense and almost pure. In other places Metrosideros is common also Meryta(?), Hemitelia, Laut. Cyathea, Coprosma, Fitchia, Bidens, and an unidentified Rubiaceous tree. At the upper edges of the forests Dodonaea, Pittosporum and Veronica become common. Ferns are very abundant as undergrowth and around the edges of the forest. Alsuites in lower part.

The ridge toward the mouth of the valley from Morongota lies, on its s.e. slope one of the richest forests I have seen in number of species. The lower part is largely Aleurites + coffee. The upper part contains Lautea, Coprosma (2 sp.), Acalypha, Meryta, Hemitelia, Cyathea, Pittosporum, Myoporum, Freycinetia, Celtis, Glochidion, Fitchia, Bidens, Piper, Metrosideros, 2 unident-

ified genera of Rubiaceae, Cordyline, and a number of others. In places it is quite damp, supporting several epiphytes.

The valley is cultivated in the bottom.

Pukumanu

I found the same two Pteris species similar to P. decussata. They are certainly distinct. They were both growing with P. decussata. The latter shows great variation in the amount of the fertile frond which is modified, some being entirely so and some being only ~~somewhat~~ modified in the upper half. Some are not modified on one side while partially so on the other. The three are easily told apart.

On the top of the ridge at the head of the valley ~~is~~ a small grove of trees including Fagraea Berteriana and Erythrina sp. The latter are very large trees, but look as though they were introduced.

1264 July 21, 1934
n. e. ridge Peralta Rapa.
0-630 m. alt.

Lower slopes above streams and marshes much eroded and grassy. Forest really begins at about 200 m., but only in patches. Rather dry here. At about 300 m. Freycinetia begins and is almost solid to near the first summit. At perhaps 500 m. where the Karetere ridge joins this one, a more or less horizontal ridge partially covered with scrubby forest of Metrosideros, Pittosporum, Lantea, Bidens, etc. The exposed parts are densely matted with Lycopodium. This upper portion is really rain forest. This ridge from here on to the first summit and also to the main summit is a knife edge covered with a dense tangled scrub, mostly Metrosideros, with some Bidens, Lantea, Freycinetia, Eurya, Weinmannia, etc. Great plants of Asplenium

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nidus are here and there along the most precipitous ridge. Erigeron (shrubby), Plantago, and Veronica grow on the edge, also the cliff itself. The Plantago ranges in size from very small plants, in size like the one I collected on Pukeiua to huge ones with a thick stem 3 or 4 dm. in height and 4-5 cm. thick. The small ones do not seem to have a bulbous caudex as do the ones previously collected.

Land shells and Isopods were numerous in the bases of the leaves of asplenium nidus.

The Metrosideros here was in flower. It is quite different from the big hairy one growing in the valleys.

Ferns and epiphytes are abundant along the ridge.

Several more types were added to the Blechnum decussata complex, recombining the characters of the other three. The ordinary form is present everywhere.

1765 July 22, 1934
Marotere Island (Baxs Rocks)

Precipitous rocks a little over 100 m. in altitude, practically without a real covering of vegetation. A sparse growth consisting chiefly of Cyperus (2 sp.), Bidens sp. Dipteris sp. and Portulaca lutea is present on the non perpendicular slopes and ledges, quite abundant in places. In the crevices in the rocks Asplenum obtusatum, Nephrolepis exaltata, and Cheilanthes sp. form tufts. Solanum nigrum is present here and there. Lycium sandwicense (not collected) was seen on the lowest slopes. Euphorbia sp. formed large mats on one slope of one end of the island. One sterile rosette of Lobelia was seen. Some of the rocks were sparsely covered with lichens. A moss (sterile) was occasional around seeps. These seeps were evidently

highly charged with $CaCO_3$ or some other substance which crystallized out around the cracks.

Under plants and stones was a remarkably large fauna of insects, spiders, centipeds and isopods. Of the latter 3 species occurred under stones. A species of Lygida ran around over rocks and seemed to collect on the under sides of overhanging rocks. At least one species of centiped, 4 or 5 of spiders, 1 or 2 of ticks, 2 of mites, 1 of Lepisma, 1 of Machalis, 2 of Collembola, 1 cricket, 1 or two of ants, 1 Lygeid, 4 species of Rhynchagonis and one other weevil all lived under stones and plants. Two or three flies and one or two moths were observed flying. The tick fly was abundant on the shearwaters.

Birds were nearly more than abundant, but all belonged to one species of gray tern and two or three of shearwaters. A couple of boatswain birds were noted.

Shearwaters were nesting and eggs and young were very abundant on small ledges and between tufts of sedges.

The island is composed of basalt, more or less bedded, with a high core in the center and the two ends capped with tilted beds of an apparently sedimentary rock.

There is evidently no coral here. Encrusting nullipore algae color the lower rocks. Ordinary algae are reasonably abundant though small and badly beaten to pieces. Balanus sp. and chitons were observed.

Eroded slopes and the steeper inner-sided ones are covered with very small Gleichenia linearis.

1266 July 24, 1934
Vairu, Rapa 300–360 m.

Rocky, mostly grass covered ridges, one or two ravines approaching the summit, the one on the S. slope approaching to within 20 m. of the summit. All just ordinary forest of this altitude — Cyathea, Metrosideros, Lauterbachia, Pittosporum, Fitchia, Bidens, Meryta, Coprosma, Celtis, Eurya, Freycinetia, etc. Possibly a little more moist than usual, as there were several ferns otherwise observed only in wet places or at high altitudes, such as the big Trichomanes, Asplenium horridum and the small, papery Pteris.

A large herd of goats range over this vicinity and Ruatara, probably 20 or 40 head.

1767 July 24 1934
Ruatara, summit, Rapa
280 - 300 m. alt.

Base ridges, the summit an almost unclimbable pinnacle of rock about 10 m. tall, with no vegetation except tufts of Asplenium sp. and Nephrolepis.
Ridges mostly grassy, some ferns.
A patch of forest comes near the summit on the n. side. I did not investigate it, but it seemed rather like that in #1766. At the top of this part there is a single large Erythrina tree, absolutely sterile.

1768 July 24, 1934
Pukutakitaki and vicinity, Rapa. About 200 m. alt.

The ridges around this little knob all seem to be sedimentary in nature, as pointed out in #1748. This includes the ridge to Vaiua (to Onio) also. Down in a side gully on the west side

is an exposure of coal. A large pit has been excavated in the bottom of the ravine. It is much overgrown with Gleichenia and I had no time to investigate it, but in the ravine below the coal was visible and I collected a large chunk. It was protruding from mud and probably was not exactly in situ. The pit is obviously the place where Russell excavated his material of it. I will go back and collect more of it, or at least examine it more thoroughly for fossils and see, if I can, what the underlying and overlying strata are. This would seem to decidedly strengthen the possibility of ~~this~~ a sedimentary nature for this part of the island.

1269 July 26, 1934
Mt. Pukutaketake, head of Hiri Valley, Rapa. alt. 360 m.

Grassy ridges and steep grassy slopes on sides toward Ahurei Bay, ~~Precipices~~ and Anarua Bay, Precipice on Hiri side. Top is a knob of basalt, with a shelf around beneath it. Selaginella and Plantago rapensis in the crevices. Polypodium sp. on the shelf. Weeds abundant. This Plantago has the leaves distinctly petioled, the petioles rounded below, grooved above, the veins distinctly palmate, united into the petiole, the caudex enlarged a tuberous. That on Mt. Perahu as I remember it, has the leaves gradually narrowed at the base into a flat, petiole like, narrow portion, without the veins united, the caudex is only enlarged in the large plants, and is cylindrical rather than tuberous.

cordate ↑

1270 July 27, 1934
Ridge bet. Tevaitahu & Tautautu Rapa. 300 m.

Grassy, rocky ridge, terraced on top. Bryum growing between the grass. Styphelia rare on rocky part of ridge. Ferns abundant on terraces of old fortifications.

1271 July 27, 1934
Hiri Valley, Rapa. 0-200 m. alt.

Wooded in upper part, with deep ravines with running streams, damp conditions. Also wooded along sides, the lower parts of these woods much planted to coffee. The main flat is all planted to taro or has been planted to taro in the past. Commeling is tremendously abundant in the vacant plots.

Paspalum sp. is abundant, but, as usual, sterile, near beach. Strand-vegetation otherwise absent.

1272 July 27, 1934
Hiri Bay, west of main valley. Rapa

Bluffs, rather low, coming down to the sea, covered with good native forest, Mostly Aleurites, of course but with admixture of Pittosporum, Boehmeria etc. In little indentations and valleys Hibiscus tiliaceus is dominant on flat portion. Citrus, Musa, Cordyline abundant. Pandanus abundant on shore. Several great Erythrina trees along shore. Very little strand vegetation other than Pandanus and Hibiscus tiliaceus. Commeling abundant. Asplenium obtusatum occasional on rocks. another Asplenium just above rocks on bluffs. several ferns in woods.

1273 July 28, 1934
Ridge from #1264 to summit of Mt. Perahu, Rapa. 600-640 m. alt.

Practically the same as #1264. Here and there are exposures of rocks with cushions of mosses.

Slopes below on N. side dense rain forest with growth of epiphytic mosses, liverworts and ferns.

The summit is covered thickly with brush. Next to Metrosideros the most abundant shrub is Rideria. The Metrosideros

1274 July 28, 1934
Ridge from summit of Perahu to mouth of Tavera Valley, Rapa.

Rain forest above, rather soon changing to moist forest of Freycinetia. This extends down to perhaps 250 m. alt. Then grass replaces it. On the outer side, the ridge is a perpendicular cliff, at least in the lower part. The grassy slopes in Tavera Valley are badly eroded. The valley is a hanging valley, the mouth of the stream being 75 or 100 m. above the sea.

Kadua is present here in a rather reduced form with leathery leaves and seemingly large flowers.

1275 July 28, 1934
Akao Valley, Dist. Tavera x Piriati.

Some slopes grassy and eroded, others with ordinary lower forest. Slopes very steep.

1237 (ctd. from p. 63)

Dodonaea viscosa –
abundant around the edges of forests from sea level to 500 m. Only mummified flowers & fruits found.

Metrosideros
Three general types – not as variable as in Hawaii. The common one is a large gray hairy one. This grows from sea level to 500 m. in places quite abundantly. It is at least occasional in practically all the forests below 500 m. The inflorescences are very hairy

Just starting to flower

A dwarf, glabrate or ~~slightly~~ pubescent form, never more than a meter tall, grows on cliffs and eroded ground from sea level to 500 m., most abundantly ~~to~~ on the bare tops of some of the peaks, such as Mangaoa and Tepiahu. Infl. glabrous

Flowering

~~Another~~ Other, a shrub up to 3 or 4 m. tall with leathery leaves, gnarled, forms dense tangles on the ridges in the rain forest on Perahu. Infl. glabrous or nearly so.

Flowering very abundantly

Cyathea
Rare at sea level, abundant from 100 m. to almost the summit, in almost all types of forest. In the grassy slopes there are patches of Cyathea in ravines, sometimes in pure stands. It is abundant at the tops and around the edges of small patches of forest on steep slopes, such as on the s. side of Mt. Ororangi and Mt. Tepiahu.

Hemitelia
abundant in the more moist woods from 200 m. to the top of Perahu. It seems to grow in the dense forest rather than out near the edges. It was quite common in the upper ~~for~~ forests of Hiri, Maii and on the slopes of Perahu.

Gleichenia linearis –
Very abundant in a much reduced form over a large part of the open slopes of the island. It seems to reclaim eroded land more quickly than the grass and sedges.

On the lower slopes there is a definite semi-bog vegetation of Gleichenia, Lycopodium & Vaccinium. The ground is not soft, but is rather damp. The Gleichenia, which is by far the most abundant plant here, is seldom more than 3 dm. tall. In the edges of forests and where it grows above the forests on high ridges, as at Kaukauamoo, it sometimes forms deep tangles. In almost every place where it grows it seems to be in places where there has been fire, erosion or over grazing by goats - excepting possibly the bog-like areas. I have no explanation for them, except possibly a continual seepage from above.

Lycopodium cernuum:-
Rare except in bog-like areas described under Gleichenia. Here it does not form a dense growth, but is abundantly distributed in the mat of Gleichenia, especially where the latter is less than 2 dm. thick.

Also present some places on talus slopes & on ridges.

Vaccinium
Scattered in small clumps or single plants throughout the bog like areas, also to some extent in the grassland. A form of it more serrate and rather elongate, is occasional occasional in the higher moist forests and in the rain forest on Peralta, esp. on the ridges.

1276 August 3, 1934
Pass bet. Pic Rouge & Mt. Tapioi and region immediately surrounding the s. side of pass, Raivavae, Austral Is.

Pass itself is a rather eroded place, the eroded slopes being matted with Gleichenia. At the top is a rather grassy ridge. The tall grass, in bunches here and there is Miscanthus japonicus. Between this is Paspalum orbiculare, Digitaria and several sedges. Metrosideros is scattered here and there making small bushes, up to 1.5 m. tall.

Immediately over the top of the pass the forest begins. It is mainly Hibiscus tiliaceus. The base of Pic Rouge on the south side is a talus slope, long since changed to soil, at the base of cliffs. This is heavily forested and the forest runs up on the lower

ledges of the cliffs. Here there is a considerable admixture of other trees - including Aleurites, Celastrus, an unidentified tree (Celastrus?), Rapanea, Celtis, Alyxia, Elaeocarpus ratonyensis. Ferns are rather abundant on the ground. The forest is what I would call a moist lower forest. Although Cyclophorus, Davallia and 3 sp. orchids grew epiphytically, there was little moss and ~~I~~ I saw no hepatics.

Hymenolepis Cyclophorus

Peperomias were abundant on the cliffs in the shade. Procris also occurred at the bases of the cliffs. One plant of Pilea bisepala was on the bare face of the cliff. Schizostachyum grew a little way down the slope.

On the other side of the road ~~is~~ is a patch of rather poor forest, badly grazed by ~~cattle~~ horses. Here again Hibiscus tiliaceus is the abundant plant. Aleurites, Inocarpus, Citrus decantium, Cordyline,

angiopteris, Cocos nucifera etc. are occasional.

Below this is a strip of Gleichenia and grass running from the much eroded top of the ridge down to the road below the pass. Metrosideros is scattered along the edges of this, particularly at the top. The Gleichenia seems to aid materially in stopping erosion which is probably as much wind as water erosion on the ridge. In this slope Miscanthus, Paspalum orbiculare, Digitaria, ~~sedge~~ 2 sedges and a number of weeds are abundant. A Phyllanthus is occasional. Dianella grows along the edge of the forest. I did not investigate the forest below this strip.

1277 Aug. 5, 1934

Pic Rouge, Raivavae - cliffs + ridge above #1276.

Cliffs forested almost all the way up, the same as at the base, but with an increasing proportion of trees other than Hibiscus tiliaceus.

The same Phyllanthus mentioned in #1276 and Cardamine sarmentosa are on the ledges, also a bit of Psilotum nudum. A tree, probably Evodia ~~is~~ present but rare on the ledges. Sophora tetraptera is rather common and in flower.

At the top the forest dwindles into a brush of Hibiscus tiliaceus, Rapanea, the celastraceous plant with small leaves, Myoporum, etc. Galinia is common here. Morinda sp. + Cocculus are vines here.

Here and there is an exposure of bare rock. Just over the ridge is bare eroded country, partially covered by Gleichenia + Paspalum orbiculare. Here and there Miscanthus becomes abundant in a ravine. Goats are evidently responsible for the condition of the ridges and the n. slope. Several were seen.

In a small draw on the n. side is a considerable patch of forest, mostly of orange trees, with almost no under brush. Here are Ficus (a banyan), a large legume like Wallaceodendron, a sapotaceous tree, Rapanea, Celastrus, the small leafed celastraceous tree, Myoporum and around the edges, Hibiscus tiliaceus.

As one goes west along the ridge, it gets lower and more eaten by goats. Down over the s. side are a number of ~~the last~~ trees of the unidentified large timber trees of Pitcairn island. Also a considerable number of the sapotaceous tree mentioned above.

In the shade of a cliff on the bark of these two latter trees, I found Vittaria and the large tufted moss found in Rapa only on the extreme summit of Perahu.

One patch of Barringtonia on the ridge.

Portulaca lutea here and there in open spaces near the top of the ridge.

Psilotum nudum

Sophora tetraptera

a sapotaceous tree

Homalium

Pandanus?

1278 Aug. 5, 1934
Shore of s. side below Pic Rouge, Raivavae.

Littoral vegetation almost exclusively trees — Casuarina, Hibiscus tiliaceus, Thespesia and Barringtonia + Sophora tomentosa. There is an occasional patch of Triumfetta procumbens and also of the beach Paspalum. A Lysimachia (?) is occasional.

A form of the common shore Apium is common.

The little strip of more or less level land between the shore and the steep slope is both cultivated and lived on. Garden things such as peppers (capsicum), Brassica etc. are present around the houses.

Canavallia obtusifolia and Vigna lutea are occasional.

1279 Aug. 5, 1934
Motu Tuitui(?), Raivavae 0–1 m. alt.

Small islet of broken coral visited by Sam Wright.

Cocos nucifera
Casuarina equisetifolia
Polypodium scolopendrium
Asplenium obtusatum
} observed but not collected.

collected:
Tournefortia argentea
Scaevola frutescens
Triumfetta procumbens
Canavallia obtusifolia
Suriana maritima
Lepturus repens
Lepidium bidentoides (?)
Ipomoea (white)
Achyranthes
Leguminous shrub

1280 August 6, 1934
Vaiarii(?)naua Peninsula, Raivavae, Austral Is. 0–93 m. alt.

A belt of forest extends almost unbroken clear around this elongate, isolated hill. It is somewhat broken at both ends, and on the e. side are cliffs, here and there. Otherwise it is practically solid from sea level to within 20 m. of the top. Some places it reaches the top. ~~The~~ By far the most abundant plant is Hibiscus tiliaceus. Citrus aurantium is scattered throughout. Thespesia and an unidentified leguminous tree are abundant on the west shore. Thespesia is fairly common on the ~~east~~ shore but the other is absent. Cocos nucifera is occasional all around. Sophora tomentosa is rare but on both sides. Pandanus is occasional everywhere from top to bottom. ~~Rapanea~~, Casuarina is abundant below and gradually gets rarer above. Barringtonia is common at low altitudes,

Jasminum didymum occasional.

mostly on the west shore. Rapanea & the small-leafed Celastraceous shrub, also Celtis, & Cordyline are occasional everywhere. One tree of the banyan-like Ficus (prolixa?) was noticed on the w. shore, also several Mango trees. A thicket of Celastrus vitiensis was noticed on the e. side. Colubrina asiatica is common on this slope, too. Santalum insulare var. raivavense is common all around near the upper edge of the forest. Psidium guajava is occasional throughout the forest and in a scrubby form makes up the brush above the forest. Glochidion is rare in the upper edge. Patches of Miscanthus japonicus above the forest reach 3-4 m. in height. Part of the top near the n. end is covered with Gleichenia

Dryopteris sp. is common. D. dentata is occasional. In one locality on the n. w. corner Angiopteris, Doodya and a very large deltoid Dryopteris are found. Polypodium scolopendrium & Nephrolepis are abundant around the shore, less so above.

Ficus sp.

Particular note should be taken of the Dryopteris dentata collected here with reference to the D. dentata & parasitica question. Also the collections on Rapa & Pitcairn.

1281 August 8, 1934
Raraterepa, Raivavae, Austral Is.
150 - 200 m. alt.

Two small patches of forest on the n. w. slope, in ravines running up to the base of the cliffs.

The smaller, higher patch is most dense and dampest. Hypolepis, Dryopteris, Doodya, Asplenium nidus & Asplenium sp. were common here, also Nephrolepis and Angiopteris. Loxoscaphe was present up at the bases of the cliffs. The trees in this patch were mostly Elaeocarpus and Aleurites. The small species of Celastraceae was common.

The larger patch is dryer and with less ferns. There are some Celtis trees and a large Ficus prolixa?. Also a few Citrus aurantium. Cyclophorus is common on the dead logs.

Surrounding these patches is a belt of guava brush. Otherwise the country for some distance around is eroded and covered with depauperate Gleichenia. In many places there are bare hollows cut out by wind. The soil is a red decomposed lava. The dikes resist erosion longer than the rest.

Alyxia occasional, esp. n. cliffs. One small patch of Ophioglossum pendulum hanging from a tree. Sophora at base of cliffs.

Thespesia occasional around edges.

Rubiaceous tree with pyriform fruit occasional. Canthium? [illegible]

1282 August 8, 1934
Upper part R. Arepha, Raivavae,
Austral Is. 15 – 50 m.

System of watercourses through open eroded country described in #1281. Along each stream is a strip of forest, chiefly of Hibiscus tiliaceus. Orange trees and thickets of bushes form a large part of the cover. Vigna lutea is present, climbing up into trees. Mucuna sp. forms great lianas running thru the tree tops and forming tangles.

Throughout this country are occasional taro patches, especially lower down.

Stachytarpheta common.

1283 August 8, 1934
W. slope Muanui, Raivavae,
Austral Is. alt. 190 – 240 m

Series of parallel ravines running down the side of the mountain, forming the headwaters of part of the Arepua drainage. These are densely wooded with the best native forest that I have yet seen on this island. Alenites is common throughout. Metrosideros is the most common tree in the lower portion, but does not extend above 175 m. The small Celastraceous tree is one of the commonest things throughout. Celtis, Meryta, Psychotria (red fruit)?, Alyxia, and Psidium guajava are occasional. The latter forms dense thickets of brush around the edges and above the forest. Citrus aurantium is common, in places forming dense thickets. Pittosporum, Pandanus, Ixora?, Pisonia, Charpentiera?, Macaranga?, Angiopteris & Celastrus vitiensis are rather rare. Ferns are quite abundant. Lomagramma is common in the upper part of the forest, climbing over trees & rocks. Dordya, Nephrolepis, Asplenium nidus, Asplenium sp., Hypolepis, Pteris, Dryopteris (2 sp.), Cyclophorus & Hymenolepis are present, more or less abundantly.

Acalypha is common. Paper, hapava,

Rubiaceous tree with purplish fruit occasional.

Alphitonia is common understory tree. Absolutely no Hibiscus tiliaceus in this forest.

The forest is a moist forest, but not a true rain forest.

The ridges between and surrounding the forests are covered by Gleichenia & Paspalum orbiculare.

1284 Aug. 8, 1934
M. slope Muamui, Raivavae, Austral Is.
250 - 0 m. alt.

Rocky, bare slopes at base of cliffs. Below this a dense jungle of orange surrounded by guava thickets. Below this a solid forest of Hibiscus tiliaceus extending to the shore. In the upper portions of this in the ravines is a considerable admixture of Meryta, Piper, Aleurites, ~~Cordia~~ Celtis, the small celastraceous tree, Rapanea, Psychotria ?, Acalypha, etc. Cordyline is common everywhere. Pandanus is occasional. Inocarpus is common low down. Orange trees are scattered abundantly thru this. Several ferns — Angiopteris, Dryopteris (2 sp.), Pteris, ~~Cy~~ etc. are common undergrowth. Oplismenus is common under the trees.

Weeds are abundant both in the lower part of the forest and above it on the open slope.

Tournefortia, Scaevola, Leptums and another grass are common on the beach, also Ipomoea procumbens.

Fruit occasional.

Rubiaceous tree with fruit [illegible]

1285 Aug. 10, 1934
S. shore of island bet. Unarau and e. point of island, Raivavae, Austral Is. 0 - 5 m. alt.

The whole coast is wooded with a heavy strand forest of Hibiscus tiliaceus, Barringtonia, Thespesia, Sophora tomentosa, Inocarpus edulis, Mangifera, etc. The Sophora is along the actual beach. Paspalum sp. & an unidentified beach grass and Ipomoea procumbens are common on the beach. Scaevola is rare. Myoporum is rare on the beach. There are many taro patches and cultivated plots along the coast. Weeds are therefore abundant.

1286 August 10, 1934
Slopes above and a little east of Vaiuru, Raivavae, Austral Is. 5 - 150 m.

Started up thru a dry forest that seemed to become fairly good near the base of the cliffs. It is mostly coffee plantation. Where there is forest it is ~~coff~~ mostly Hibiscus tiliaceus. In one area, however, Pittosporum becomes the most abundant tree. Alyxia is occasional throughout. Rapanea is common, also Citrus aurantium. The small leafed Celastraceous tree is occasional above, also Celastrus vitiensis. At the very top of the forest are a few Metrosideros trees. The Rubiaceous tree with pyriform fruits is occasional.

In one place there is a talus slope of basalt blocks up to 5 dm. in diameter. No trees here. Davallia, Nephrolepis and a few weeds are common. [Peperomia sp. very abundant, like leptostachya] Vittaria grows in crevices on tufts of moss. Mosses are the most abundant plants here. There are two or three that I found on Rapa only in the

summit of Perahu. They fill the crevices and in many places, cover the surface of the boulders.

I came down thru a steep more moist forest, practically solid Hibiscus tiliaceus. Angiopteris, Asplenium sp. Dryopteris 2 sp. Nephrolepis, Davallia & Cyclophorus are common. One tree of Homolanthus sticks up in the middle of this forest. Below it gradually becomes mixed with orange, Inocarpus, etc.

1287 Aug. 10, 1934
E. point to Anatonu, Raivavae, Austral Is. 1-5 m.

Strand vegetation very poor here. The beach is grass covered. The trees do not extend as near the water as on the other side. The Hibiscus seems to be in very poor condition, either from wind or disease. This side does not at all present the luxuriant appearance observed in #1285 on the other side.

1288 August 11, 1934
Mts. Mwatapu & Turivao,
Raivavae, Austral Is. 5 - 250 m.

Going up n. side - mostly solid Hibiscus tiliaceus below - a few patches cultivated & formerly cultivated, one large patch open, covered by Miscanthus and young Fantalum trees about 2 m. tall.

This whole slope is a talus slope lying against the foot of the cliffs, ~~lying~~ sloping at an angle of 45°. The top is about 160 - 200 m. alt. The Hibiscus in places reaches the base of the cliffs. In other places there are large patches of native forest left. These are about equally Pandanus and Aleurites, with a few Celtis trees and a liberal admixture of orange. There is orange also in the Hibiscus forest. The only other tree occuring in any numbers is the Sapotaceous one found at the west end. Alyxia is common from a very low altitude to the top of the forest. This forest is rather dry, but still there

is considerable undergrowth of ferns. No Angiopteris was noticed.

Metrosideros appears at the base of the cliffs. In one place Pandanus almost made a solid forest at the bases of the cliffs. It varies considerably here. Along the base of the cliffs is a strip that is almost bare, grown to Commelina nudiflora. On the ledges of the cliffs Hymenolepis is common, also Nephrolepis, Polypodium scolopendrium, ~~and~~ Davallia and Cheilanthes. Plectranthus australe and the little white flowered mint previously found are rather rare on the ledges. A Boerhaavia having very small leaves was here. Myrsine appeared at the bases of the cliffs, but becomes the dominant plant on the ridge. Portulaca lutea is common on the ridge. The cliffs on the south side are almost dominated by Hymenolepis. Asplenium sp., Cheilanthes, Plectranthus, Peperomia sp. a grass & a sedge are occasional.

Several mosses are here, also Vittaria, on rocks again. Mephrolepis and Davallia are common.

At the base is considerable commelina. The forests on this side are poor — sparse and scattered. Between are steep fern covered and grassy slopes. Most of the forests here are pure Hibiscus, but in one place the top is partly Alanites with a few other trees such as Alcophyllus, Cyperozma, Pandanus, Celtis, etc. Myoporum is abundant at the top of this, and also of the Hibiscus forest. It is a little more moist over here, but not much.

Considerable areas of Gleichenia visible below.

1788 Aug. 15, 1934

Matauru to Ataora, Tubuai, Austral Is. a.m. alt. c

There is a wide flat between the shore and the foot of the mountains, the shore side of which we looked over. It is largely cultivated, except right along the beach. Between the cultivated patches are ~~large~~ strips of forest of Hibiscus tiliaceus with a scattering of Calophyllum and Barringtonia. Along the top of the beach and along the inlets at the mouths of streams are belts of Hibiscus. Under this along the beach is a dense strip of Scaevola frutescens, some of which really grows into trees, the largest seen being 4 m. tall & 2 dm. thru at base. Sophora tomentosa is common throughout. Ipomoea pes-caprae & Paspalum sp. are common on the beach. Triumfetta procumbens is on the flat. Weeds and cocnuts are everywhere.

1289 VIII/15-23/34
Tubuai Island, Austral Is.

(Information about interior all furnished by other members of party.)

This island is composed of two ~~of~~ masses of basalt, separated by and surrounded by a slightly elevated coral plain, 1-2 m above sea level. This plain is in most places covered by a lowland forest of Hibiscus tiliaceus, Casuarina, Barringtonia, Psidium and quite a few introduced plants. Other parts of this plain are marshes, covered by a large sedge. Sloughs run here and there through the forests, partially under tidal influence. Coconuts are planted abundantly over many parts, particularly right near the coast.

Most of the lower slopes are covered by a ~~fo~~ dry forest of Hibiscus tiliaceus which in places, such as the n.e. slopes of Mt. Taita and the w. slopes of the western mountain mass,

runs up to 300 m. or more. This seems to be a type of invasion forest which follows fires. The upper slopes and ridges are for the most part bare grass or gleichenia or sparse guava bush. In places around the highest peaks are patches of pure native forest. Metrosideros, Aleurites, Celastrus vitiensis, an unidentified, possibly Celastraceous shrub Rafnanea, Ixora, Psychotria?, the rubiaceous shrub with pepiform fruits, Charpentiera, Cyathea, Angiopteris and many other ferns. In fact in some patches ferns are by far the most abundant plants.

crotalaria pentaptera

The slopes for the most part are thickly strewn with large basalt boulders or are basalt talus.

1290
Hills n.w. Moerai, Rurutu, Austral Islands VIII/24/34
10-60 m. alt

Outer bluffs of makatea (raised, dissected coral), inner hills of weathered basalt, mostly weathered to a dense, clay-like red soil.

The basalt soil is more or less covered with a rather dry forest of Hibiscus tiliaceus & various introduced plants such as Mangifera, Psidium guajava, Morinda citrifolia, etc. The ravines are moist, some having streams, and filled with ferns - angiopteris, Blechnum, Dryopteris, Hypolepis, etc. In the dry forest is an undergrowth of Nephrolepis, Polypodium scolopendria + weeds.

Psilotum triquetrum in the crevices of the coral rocks.

On the coral, which is partially covered with soil, is a more natural dry forest of Hibiscus tiliaceus, Ficus tinctoria, guettarda speciosa, an unidentified leguminous tree, etc. On the trees are many lichens + Cyclophorus and Taeniophyllum epiphytic. Guavas forms dense thickets on the upper edge.

1291 August 30, 1934
Same as #1290, further out - Mato Naa. 50 m. alt

Tops of raised coral bluffs forested with Hibiscus tiliaceus, Ficus tinctoria, guettarda speciosa, Psidium guajava, Casuarina, etc. Kadua on cliffs. Cyclophorus very abundant on Ficus & Guettarda, but not present at all on the Hibiscus, which is the most abundant tree by far. I do not understand this at all.
Land shells are very abundant in the holes in the coral.

1292 Aug. 31, 1934
Vitaria, Rurutu, Austral Is.

Mostly coconut plantations below 40 m. alt. with thick undergrowth of Hibiscus til. & Morinda citrifolia. Said to have been burned over.

1293 Aug. 31, 1934
Mato Tea, Rurutu, Austral Is.

Cliffs of raised coral, much dissected. Strand flora. Kadua + Lycium sandwicense abundant in crevices.

Wedelia x Hibiscus tiliaceus + Thespesia in mouths of small valleys or ravines. Also what is evidently a variety of Hibiscus til. but with leaves not tomentose beneath and not observed in fruit or flower. ~~xxx~~ rather abundant here. The parts of the bluffs which are not absolutely perpendicular, overhanging are covered with a scrub of depauperate Hibiscus, Barringtonia and Guettarda. A few Pandanus and Casuarina scattered here and there. Peperomias of two species, Procris, Adiantum capillis-veneris (?) + Asplenium obtusatum are present in crevices where they are more or less sheltered, the Asplenium very abundantly and even out in exposed places.

4
1292 Aug. 21-Sept. 4, 1932

Rurutu, Austral Is.

A much weathered basalt island, surrounded by a raised coral rim 50-60 m. high. This rim has been cut away until now only occasional cliffs of it are left, between which are broad strips of flat land with the basalt rising behind.

The original forest vegetation is almost gone, only a few little patches remaining near the tops of the highest hills, (400 m). I did not get to see this, but it is evidently a moist to wet forest, with an abundance of ferns.

All the lower forest is predominantly Hibiscus tiliaceus. On the flat lands most of it has given way to Coconuts.

The coral bluffs have a vegetation described before.

1293 Sept. 4, 1934
Rimatara, Austral Is.

Low and almost entirely surrounded by a rim of raised, dissected coral. This rim is some meters higher than the general level of the ground inside, excepting the hills.

Lowlands planted to coconuts. The hills are for the most part barren or grown to weeds. A few patches of forest exist on the low rounded hill. They are mainly Hibiscus tiliaceus, with some Cordia and a scattering of Glochidion. Narrow bands of Hibiscus tiliaceus are found along the canyon bottoms. There are taro patches here and there along these tiny streams. In several places in the lowlands there are swamps.

The vegetation of the rim is a distinct type, largely composed of Pisonia umbellifera, Hibiscus tiliaceus, Barringtonia, Casuarina, a Guettarda. Cyclophorus is an abundant epiphyte. A Peperomia like leptostachya is abundant on the rocks

also some Pandanus

a large Peperomia like that found on Henderson is common both on rocks & trees. On trees it tends to have ovate acuminate leaves and on rocks they tend to be obovate, obtuse.

On the outer side of the rim there is a Timonius (?) similar to that on Henderson, with dimorphic flowers.

The ordinary strand vegetation is found on the outside of the rim and in the gaps in the rim.

I had a chance to explore, there seems to be an almost pure stand of Pandanus over the island, surrounded by a belt of Scaevola brush. A few other things are scattered here & there in both types.

1294 Sept 6, 1934
Maria (Hull) Island, Austral Is.

Atoll with 4 islets. All are heavily wooded. I did not visit the larger n.e. one. The center one is all coral sand. Pandanus, Guettarda, Tournefortia, Pisonia ~~are~~ the abundant trees. Scaevola is abundant around the edges. This is the only islet on which Gouldia is found. Asplenium nidus, Nephrolepis, Polypodium scolopendrium are locally abundant.

On the s.e. islet the substratum is broken coral. Three types of vegetation are evident here. On the inner third of the islet there is a magnificent forest of Pisonia with some Tournefortia, Guettarda, Calophyllum etc. Ferns Asplenium nidus, Nephrolepis & Polypodium grow luxuriantly here. The middle part is almost a pure Pandanus forest. The outer end is brush which is mainly Scaevola.

On the s.w. islet, as far as

1795 Sept 15, 16, 17, 26, 27, 1934
Papenoo Valley, Tahiti
alt. 0-500 m.

Wet lower forest along a swiftly flowing, large stream. In the stream are at least 2 kinds of fish, three kinds of fresh-water snails and at least one shrimp, a very large crayfish-like one.

The forest is largely made up of Hibiscus tiliaceus and bamboo. Some other things, especially oranges are scattered thru this forest. along the river are large growths of a large ginger, probably Amomum cevuga, sterile.

Epiphytes are abundant on the trees. Particularly interesting are the Ophioglossum pendulum, which hangs to a length of 5-10 dm. and is twisted; the long pendant Vittaria; the Psilotum complanatum which does not seem the same as the Hawaiian one. It is long & pendant, up to 1 m. several times dichotomous, and purely lance-elliptical in t. s., not abruptly thickened in the middle.

Orchids are abundant but not showy.

A Peperomia is epiphytic here which is a long vine sometimes over a meter, sometimes pendant. The fruiting spikes are on the upturned ends of the vine.

1796 Sept. 17-26, 1934
Slopes of Mt. Orofena above the n.w. part of Papenoo Valley
Tahiti alt. 500-1750 m.

Steep slopes and ridges. The slopes are very wet, covered by a rain forest composed chiefly of tree ferns (Cyathea & Hemitelia) and Freycinetia, with trees of several kinds scattered thru it and a dense undergrowth of ferns, especially huge specimens of Asplenium nidus.

Epiphytes are extremely abundant, including ferns, filmy ferns of several spp. Tmesipteris, Ophioglossum pendulum similar to the Hawaiian form, multitudes

of mosses + lichens + liverworts, ~~[illegible]~~ several species of orchids, and a Peperomia a seedling evidently related to the one below, vine like, but with different shaped leaves and two spikes at each node along the stem. There are several variations of it differing in length + thickness of spike, shape of leaf, length of pedicel, etc.

More trees are found on the ridges - notably Ilex, Fuchsia (?), Metrosideros, Vaccinium (shrub), and an unidentified tree with pendant spikes. Three species of Gleichenia and another Pteris like or Cheilanthes-like fern with a tangled habit occur on the more open ridges. Also Lycopodium cernuum.

1297 Sept. 23, 1934

Main s. ridge of Orofena, (Bet. Puraumu + Papenoo), Tahiti alt. 1600 – 1750 m.

Turfy ridge with low brush of Metrosideros, Vaccinium, Ilex and the shrub with pendent spikes. Thick moss on the crest. A reduced form of the common large, stiff Elaphoglossum of the forests below is common in this moss. Lycopodium cernuum and one other species are common. Also Gleichenia Tahitensis Copeland.

This brush merges gradually with the forest below.

Ferns are abundant – including two Blechnums, Polypodium like Acrolepidium etc.

1298 Sept. 30 - Oct. 3, 1934
Huahine, Society Is.

I did not see much of this island. Its forest seems largely burned off & replaced by Hibiscus tiliaceus. Quite a bit of native material is mixed with it.

The dry forest down near the shore is mostly Hibiscus, but contains a number of native plants get down to the sea. There are also introduced plants in abundance.

The Hibiscus tiliaceus presents more variation here than I have seen elsewhere. There is the normal large leaved, ~~fruba~~ tomentose form. A form with rather smaller tomentose leaves with reddish veins. Young plants and shoots from old stumps are often almost glabrous and presenting very diverse leaf forms large & small & from entire to serrate & even trilobed. The most peculiar form

is one which is abundant in the villages and which I didn't see outside the villages. I saw and collected it on Rurutu also. Every tree but one ~~I~~ that I have seen has been sterile. It has small serrate glabrous leaves. The one tree which had flowers was in Fare, Huahine. It had one branch which had flowers and young fruit, the rest of the tree being sterile. This branch had the leaves of a perfectly typical Hibiscus tiliaceus. I have no explanation. The natives must propagate the thing by cuttings. The shape of the tree is not bushy like an ordinary H. tiliaceus, but has a trunk and a rounded top, making a really ornamental tree.

1501

10799 Oct. 4-10, 1934
Raiatea, Society Is.

W. end very dry and barren.
Most of the good forest is on the higher parts of the mountains. The lowlands are all denuded and covered with Gleichenia. The natives seem to have a habit of burning over these lower forests — why I do not know. We observed large burned patches here and there around the island. It is said that in the old days of the monarchy there was a heavy penalty for setting fires, but that under French rule there is no penalty, with a consequent increase in burning.
I was not ashore much here.

82

11300 Oct. 13, 1934
Vaitape, Bora Bora, Society Is.
alt. 0 - 175 m.

Great Cordia trees abundant along the beach, also Hibiscus tiliaceus both the ordinary variety and the serrate leaved bright green variety. Also a few plants of a strange variety with deeply and irregularly trilobed leaves.
The forest on the lower slopes of the mountain above town is exceedingly dry. On the ridge it is gedara brush with a few Glochidion and other native trees & shrubs scattered here & there. On the steep slope it is mostly Hibiscus tiliaceus, with Piptums. Barringtonia, etc. scattered here & there. Much of this slope is cultivated — Manihot, Artocarpus etc.
This island as a whole, what we saw of it seems very dry and barren. The upper part is mostly sheer precipices.

1301 Oct. 16, 1934

Flint Island

Atoll with lagoon almost dried up - only a small lake of brackish water in the center.

Intensely cultivated for copra. Practically all the native vegetation destroyed.

A narrow fringe of Tournefortia around the beach. One small patch of Scaevola observed. Flowers purple, fruit white. Small patch of Pandanus and one Pisonia tree observed at south end. A few young Cordia trees, almost dead - probably planted. White Ipomoea occasional along windward side climbing in Tournefortia. Lepturus and Boerhaavia over ground in plantations. Portulaca - seemingly intermediate between lutea and oleracea - abundant in one small area.

Large bare area on the north end has the appearance of a sedimentary dome with the top broken off - concentric layers of coral

limestone sloping up from 3 sides. Only a few stunted Tournefortias and tiny tufts of Lepturus have obtained a foothold here.

Carica papaya abundant but strangely stunted in the plantations near the settlement.

A few Morinda citrifolia scattered here & there - very narrow leaved, slender & small fruited.

Fleurya ruderalis and Lepidium abundant. The Lepidium has both entire and serrate leaves.

Brackish lagoon surrounded by Cyperus pennatus and Lepturus, the latter growing out on the surface of the water. Melania (snails) very abundant.

1302 Oct. 17, 1934
Vostock Island

We could not land here because of the high surf and strong back wash.

It is a small island, probably around 1 km. long. It is completely covered by a very old and well developed forest of Pisonia grandis. This forms a dense growth, tapering down on the windward end and breaking off abruptly at the other end. From a distance of about 200 m examination with powerful binoculars failed to reveal any other plants. No coconuts were seen whatever.

At the report of a rifle birds in enormous numbers flew up from the trees.

The water was swarming with small sharks.

1303 Oct. 21, 1934
Christmas Island, Line Is.

A large island, with considerable land area. The island, over all is 35 miles long, and its lagoon is less than half that long.

This island is absolutely unlike any other that we have visited. The lagoon is surrounded by a fairly wide belt of flat land with a wide passage on the southwest side. The land surrounding the lagoon becomes rapidly wider as the north side is approached, and on the northeast side a peninsula about 4 miles wide and 15 or 20 miles long extends out from this side. This peninsula contains a large number of salt water ponds and lakes.

The sides, around the lagoon are pretty thoroughly planted to coconuts, although

on the outer side of the ~~[illegible]~~ northwest portion there are large areas of open prairie country, covered with a bunch grass growth - Leptums repens and scattered low rounded trees of Tournefortia argentea. Here, in the evening, were great swarms of wide-awake terns, flying high in the air like great flocks of midges, uttering shrill, metallic croakings, making a terrific din. There were tens of thousands of these birds.

As we went around toward the north side the ground took on more and more of ~~an alkaline~~ the character of salt flats. There is a variation of a meter or two in the level of various portions of the land. The higher portions support a considerable, but scattered growth of rounded bushes of Scaevola frutescens. Between this is Leptums, Lida Pallas and Heliotropium anomalum. The latter is,

here, quite unlike in its habit of growth.

On the lower ground, and near the ponds, which become more numerous here, the Scaevola becomes smaller and more scattered, a little Gouldia Romanzoffiana becomes scattered among it. Heliotropium becomes more abundant. In the extremely saline places, Heliotropium, in a small, very depressed form becomes the dominant plant. Most of the other plants are absent here and a tiny grass, Eragrostis fatcatum appears, but not very abundantly. Here is found the hard pan mentioned by Christopherson, and the growth of plants, when there is any, is only in the cracks in ~~the~~ this hard pan. The ground is covered with small marine shells of a number of species.

This general character of vegetation continues

where Portulaca lutea is found in abundance

Patches + strips of almost pure Juncus maritimus near low + then irregular this region

as far out on the peninsula as we went, between the numerous scattered ponds of various sizes. Large areas are covered with Scaevola brush, scattered with Lida, Lepturus and Heliotropium between them. Scattered among these are salt flats with little but Heliotropium

along the north west side of this peninsula, along the shore of Wreck Bay, is a strip of sand dunes, the highest of which is Joe's Hill, about 12 m. high. They are covered with Scaevola, Heliotropium, Lida, Lepturus and on the seaward side - Tournefortia

The ponds are very interesting, and I do not quite understand them. They are not all the same level. Two ponds 30 m. apart will be as much as 1 m. apart in ~~two~~ surface level. How this can be I do not understand. They are all, as far as I tasted

them, very salty. Some have a soft bottom while others have a hard pan bottom. They are of various colors - black, blue, green, red, etc. I did not find the cause of the color except in the case of the red. This is caused by a growth of a gelatinous alga of some kind - probably a diatom, growing in layers as much as 10 cm. thick on the bottom. The mass is of a brick red color.

The Scaevola here shows little, if any, significant variation. In no place did it show the crawling, narrow leafed, yellow flowered form characteristic of the ~~atolls~~ atolls of southeastern Polynesia.

The gouldia is absolutely the same as the common form in the Tuamotus. The berries were not pendant in any observed plants. In the regions where I observed it it was not at all abundant.

It is the most abundant shrub or large weed plant in this island.

It is scattered sparingly in the interior swales and salt flats - in some places associated with Heliotropium and Scaevola, and in other places with Leptunus and a little Heliotropium. We did not visit the southeastern peninsula where it is supposed to be very abundant, forming one of the major plant communities.

I examined the fruits of many Lida plants. They all seemed to be typical L. pallax. Nothing resembling L. cordifolia was noticed. The leaves of all the material seen were cordate.

The Boerhaavia in the region of Joe's Hill was all of one type - possibly the B. hirsuta of Christoffersen. It is slender and densely pubescent all over, with small pink flowers. It is scattered among the Leptunus-Lida-Scaevola vegetation. Other forms were noticed but not examined elsewhere.

Rapa vegetation types

Hibiscus tiliaceus, tangled mid lower areas around and just above shores of Ahurei Bay, up to 30-40 m.

"Bogs" or gentle lowest slopes ash. around head of Ahurei Bay, mostly dwarf Gleichenia to 3-4 dm, Lycopodium cernuum and Vaccinium, ground ~~so~~ wet, seepy, but not muddy.

Gleichenia reclaiming erosion and fire scars and areas overgazed by goats, small stature except occasional deep tangles in heads of ravines and on boulder talus.

Grass - cleared or burned slopes, with only sporadic woody vegetation, commonest graminoid is Cyperus brevifolius, but with Paspalum orbiculare, patches here and there of Miscanthus, Rubus rosaefolius, local invasion by very aggressive and luxuriant commelina diffusa.

Areas of coarse ferns on slopes, a large Blechnum, or perhaps several such (called in field notes Pteris decussata) extremely variable in aspect, development of fertile frond or portions of fronds.

Areas of small Cyathea, or a more
species, on otherwise fern grassy slope.

Ordinary broadleaf slope-forests, rich
in small tree species but composition
locally variable - Metrosideros (large trees) Cordia, Claoxylon, Bidens, Fitchia, Nertera,
Euonya, Olearia, Pittosporum, Canthium, Psidium,
Coprosma, Geniostoma, Dodonaea, Boehmeria,
Alectites, Celtis, Freycinetia, Weinmannia, Hebe,
Streblus, Acalypha, Alloptylus, Homalanthus,
Alyxia, Glochidion, Piper, Sclerotheca, Cyathea
Myrsine
invaded by Coffea arabica tangled with
Mucuna vine

Ground cover of ferns, small Scirpus,
Ipomoea At higher elevations, standard cliffsyte and
would be called montane rain forest.

Low elevation front of Pandanus, Asplenium, Psidium
Erythrina, Hernandia, Alectites, Celtis, Dodonaea,
herbaceous undergrowth of ferns, Oxalis, Cyperus
Eragrostis, Ageratum and other weeds.

Low often sparse Metrosideros scrub
Hedyotis,

Freycinetia stands

High ridges covered by dense tangled mostly Metrosideros scrub with Bidens, Cerokia, Eurya, Freycinetia, Clearia, Astelia, Plantago, abundant ferns and epiphyte

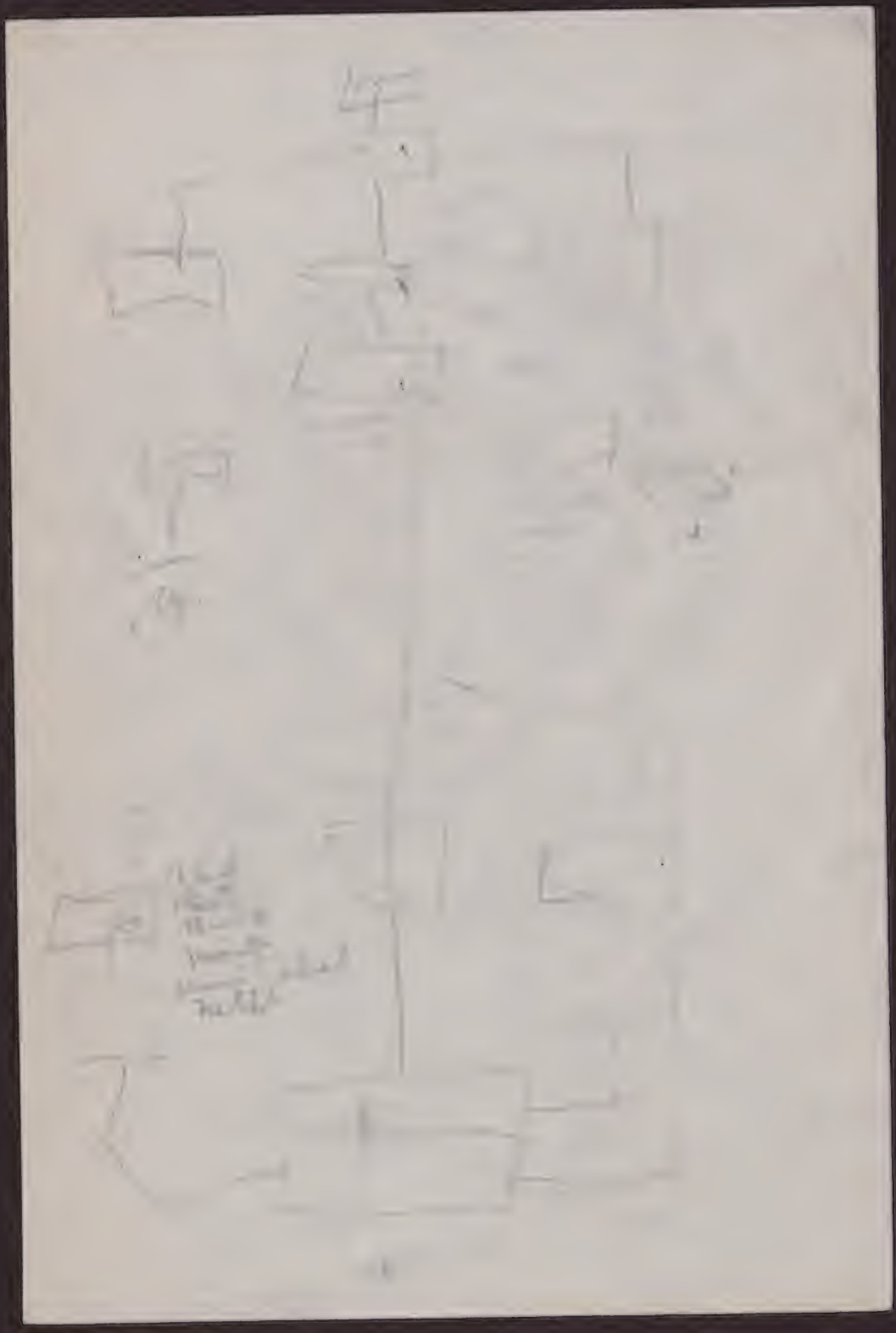
Taro patches in valley bottoms and on terraces, tending to be overrun by Commelina diff

Coffee plantings, undergrowth kept clear or not, Coffea naturalizing into ~~[illegible]~~ adjoining forests, ubiquitous on valleys and on not too steep slopes.

Low elevation stands of Citrus, Fagraea, Erythrina, Cordyline, Melia, Aleurites, Cocos

Littoral vegetation on rocks, Lycium, Apium, Eleocharis, Scirpus nodosus, Cardamine, Paspalum cf. distichum just above the Casuarina, Lycopodium Hibiscus tiliaceus

Marshy places with Scirpus cf. lacustris Cyperus, Eleocharis,



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Dr. Cooke brought two very distinct forms back from ~~~~ Motu Tabu.

For a good, detailed discussion of the vegetation of this island see E. Christopherson - Bishop Museum Bull. 44 1927.

Collection number book beginning with 8658.

8658 } Kipapa gulch, Oahu, H. I.
8717 }

8718 } South Opaeula Gulch, Oahu, H. I.
8758 }

8759 } Waikane Schofield Trail Oahu, H. I.
8812 }

8813 } Honolulu, Oahu H. I. (Cult.)
8844 }

8845 } L. Opaeula Gulch, Oahu, H. I.
8850 }

8851 } Laimuki, Honolulu, Oahu, H. I.
8857 } (Medicinal weeds)

8858 } Manoa Valley, Oahu, H. I.
8869 }

8870 } Waimea, etc. Oahu, H. I.
8876 }

8877 } Kawaihapai, Oahu, H. I.
8879 }

8880 } Lanikai, Oahu, H. I.
8883 }

8884 } Poipoi Island, Oahu, H. I.
8892 }

8893 } Mt. Kaala, Oahu, H. I.
8939 }

8940 } Upper Manoa V. Oahu, H. I.
8943 }

8944 Kawaihapai Oahu, H. I.

8945 Kahalun, Oahu, H. I.

8946 Kipapa Gulch, Oahu, H. I.

8947 } Panaewa Zoo, etc. Oahu, H. I.
8981 }

8982 } Puu Kana, Oahu, H.I.
9070 }
9071 } Puu Ohanana, Oahu, H.I.
9035 }
9036 } Puu Kana, Oahu, H.I.
9038 }
9312 Honolulu, Oahu, H.I. (Cult.)
9314 } Kalanas Ridge, Oahu, H.I.
9367 }
9368 } Honolulu, Oahu, H.I. (Cult.)
9391 }
9393 } Lae-Malaekahana, Oahu, H.I.
9440 }
9040 } Makua V. Oahu, H.I.
9071 }
9072 } Mt. Kaala, Oahu, H.I.
9179 }
9130 } Koko Crater, Oahu, H.I.
9141 }
9142 } Lanikai, Oahu, H.I. (algae)
9148 }
9149 } Waikiki, Honolulu, Oahu, H.I.
- 9179 } (algae)
9180 } Pupukea-Kahuku Pt. Oahu, H.I.
9234 }
9235 } Kawela Bay, Oahu, H.I.
9274 }
9334 } Honolulu, Oahu, H.I. (Cult.)
9336 }
9337 } Waianae Kkr. Oahu H.I.
9369 }
* 9370 } Mauna Ridge, Oahu, H.I.
9306 } 9275 } Pelea peduncularis H. Levieille

9307 } Waianae Kar, Oahu, H.I.
9312 }
9313 Honolulu Oahu, H.I. (Cult.)
9314 } Kalanas Ridge, Oahu, H.I.
9367 }
9363 } Honolulu, Oahu H.I (Cult.)
9392 }
9393 } Lae-Malaekahana, Oahu, H.I.
9440 }
9114 } Kalanas Ridge Oahu, H.I.
9474 }
9475 } Pohakea Pass, Oahu, H.I.
9517 }
9513 } Waikane-Schofield Tr. Oahu, H.I.
9542 }
9543 } Kipapa Gulch Oahu H.I.
9566 }
9567 } grasing
9599 }
9600 } Waiau Valley, Molokai, H.I.
9679 }
9682 } Manoa Cliff Trail, Oahu, H.I.
9703 }
9704 } Palolo-Waialae Nui Oahu, H.I.
9718 } (check)
9719 } Kipapa Gulch, Oahu, H.I.
9823 }
9871 } Maui, H.I.
Check 10054 }
10055 } Hawaii, H.I.
10279 }
Check 10275 } Waikane-Schofield Trail, Oahu, H.I.
10296 }

10297 } Heeia. Oahu, H.I.
10298 }
10299 } ~~Kaaeyla~~ Kaala, Oahu H.I
10371 }
10372 }
10373 } Kaumla Oahu, H.I
10357 }
10358 } Waimanalo, Makapuu, + U.H. Honolulu, Oahu
10361 }
10362 } Mt. Kaala Oahu, H.I.
10332 }
10383 }
10342 }
10379 } Kahana V. Oahu, H.I.
10416 }
10417 }
10421 }
10422 } Hawaii, H.I.
10511 }
10512 } Makaha V. Oahu, H.I.
10524 }
10575 Kailua, Oahu, H.I.
10526 } Honolulu, Oahu, H.I. (wash)
10533 }
10537 } Honolulu (on H.)
10546 }
10547 Kahuku, Oahu, H.I.
10548 } Waialua Oahu, H.I.
10549 }
10550 Honolulu Oahu, H.I.
10551 } Mokapu + Poloia I. Oahu, H.I.
10585 }
10586 } Honolulu, Oahu, H.I.
10590 }

10591 } Makapuu, Oahu H.I.
10593 }
10594 } Southwestern U.S. Forages
10707 } sent to F. M. Johnston
10708 } Mt. Kaala, Oahu, H.I.
10709 }

~~Kalihi Road Honolulu, May 24, 1935~~
10710

(over)

Ridge from top of Wahelawa
Rise to Kainaanika, Palolo —
Waialae Nui, Oahu, H. I. (1305)
Dec. 27, 1934

~~10729~~
10729 Freycinetia arborea
10729½ Scaevola
10730

10710 Gouldia
11 Metrosideros
12 Cheirodendron
13 Cheirodendron
13½ Pittosporum
14 Ophioglossum pendulum
15 ~~Gouldia~~ Xylosma hawaiiense
16 Santalum Freycinetianum Gaud.
17 Asplenium acuminatum
18 Gouldia terminalis var. coriacea
19 Asplenium sphenotomum ?
20 Pipturus
21 Asplenium
22 Wikstroemia
23 Cheirodendron
24 Broussaisia arguta Gaud.
25 Scaevola
26 Bidens
27 Scaevola mollis
28 Wikstroemia
29 Freycinetia arborea
29½ Scaevola

Lower slopes of Konahuanui, above Nuuanu
Pali Road, Kaneohe, Oahu, H.I. Jan. 5, 1935
30 Pipturus
31 Phyllanthus sandwicensis var. ellipticus

10732 Eragrostis grandis
10733 Straussia
10734 Cyrtandra grandiflora
10735 Cyrtandra grandiflora
10736 Bidens
10737 Strongylodon lucidus
10738 Scaevola Gaudichaudiana
10739 Gouldia terminalis var. coriacea
10740 Kadua
10741 Gouldia terminalis var coriacia X G. terminalis
10742 Kadua
43 Bidens
44 Straussia
45 Artemisia
46 Selaginella Menziesii
47 Euphorbia multiformis var. mauiana
48 Foeniculum vulgare

Head of Nuuanu Valley, Nuuanu
Oahu, H.I. Jan. 5, 1935
~~49~~
49 Pipturus
50 Scaevola Gaudichaudiana
51 Pipturus
52 Pipturus

Honolulu, Manoa, Oahu, Jan. 8, 1935
53 Pteris sperma
54 Inga ~~edulis~~ Inga
55 Phyllanthus niruri (Jan. 8, 1935)
56 Murraya exotica
57 Eriobotrya japonica

Kawailoa Girls School, ~~Waimanalo~~ Kailua,
Oahu, H.I. (with V.M. Oliveira) Jan. 3, 1935

10758 Bombycidendron Vidalianum

Honolulu, U.H. Campus. Jan. 9, 1935

59 Montanoa

Kailua, ridge, not far from base of Nuuanu Pali
Jan. 12, 1935

60 Caesalpinia sepiaria

N.E. side Puu Olomana, Kailua
with V.M. Oliveira 1/20/1935

61 Psilotum nudum
62 Pipturus
63 Pipturus

Honolulu, U.H. Campus, Jan. 21, 1935

64 Cotoneaster pannosa
65 Hibiscus mutabilis
66 Inga Inga
67 Dombeya

Honolulu, Univ. Ave. Jan. 22, 1935

68 Sporobolus diander
69 Paspalum fimbriatum
70 Cassia mimosoides

Koko Head, Moanalua, Oahu, Jan. 23, 1935

71 Alysicarpus vaginalis

Maunawili, e. base, Puu Konahuanui, Koolau Mts., Kailua, Oahu.
With W.m. Storey & V.M. Oliveira Jan. 23, 1935

72 Spermacoce

10773 Dryopteris ~~Goniopteris~~ Goniolepis
74 Elaphoglossum reticulatum
75 Lycopodium polytrichoides
76 ~~Trichomanes~~ Hymenophyllum obtusum
77 Tectaria gaudichaudii
78 Pipturus
79 Phyllostegia glabra
80 Pipturus
81 Scaevola gaudichaudiana f. leucocarpa
82 Pipturus
83 ~~Kadua~~ Hedyotis acuminata f. koolauensis
84 Pipturus
85 Dryopteris cyatheoides
86 Eupatorium adenophorum
87 Perottetia sandwicensis
88 Euphorbia multiformis var. microphylla
89 Bidens
90 Ophioglossum pendulum
91 mass
92 Scaevola gaudichaudiana
93 Polypodium lineare
94 Cladium mayenii
95 Selaginella Menziesii

Nuuanu Valley, Oahu 2/10/1935

96

Waikane-Schofield Trail, Koolau Mts.
Waikane, Oahu 2/10/1935 with V.M. Oliveira
97 Gouldia terminalis var. typica f. entypica
98 Pisonia

Waikane-Schofield Trail Koolau Mts.
Kahana, with V. M. Oliveira 2/19/1935

10799 Dryopteris
10800 Dryopteris cyatheoides
01 Pluchea odorata (with A. Fuchs)
02 Gouldia terminalis var. coriacea
03 Littonia

Waikane-Schofield Trail, Koolau Mts.
Kahana-Waianaeuka Divide 2/10/1935
04 Gouldia St. Johnii var. typica with V. M. Oliveira
05 Viola oahuensis
06 Gouldia St. Johnii var typica
07 Gouldia
08 Gleichenia Owyhensis

Nuuanu Valley, Koolau Mts.
350 m. 2/14/1935
09 Pisonia

Kamanele Park, Manoa, Honolulu, 2/16/1935
10 Cordia subcordata

University campus, Manoa, Honolulu, 2/16/1935
11 Lapindus oahuensis
12 Hura crepitans
13
14 Erythrina parcellana
15 Heritiera littoralis

Haleauau Valley, Puu Kaala,
Waianae Mts. Waianaeuka, II/24/1935
16 Pipturus
17 Antidesma platyphylla

10818 Gouldia terminalis var. macrothyrsa
10819 Gouldia
10820 Gouldia terminalis var. kaala f. eukaala
21 Phyllostegia glabra var. macrae
22 Gleichenia

Main east ridge, Puu Kaala.
Waianae Mts. Waianaeuka
23 Phyllostegia hastatoides II/24/1935
24 Gouldia terminalis var. kaala f. eukaala
25 Gouldia terminalis var. kaala f. eukaala (summit)

Manoa Cliff Trail, near Pauoa Flats,
Koolau Mts. III/10/1935
26 Antidesma platyphylla
27 Antidesma platyphylla
28 Gouldia terminalis var. gracilis

Puu Kaviwi-Puu Kaala ridge,
Waianae Mts. Makaha-Waianae Kai
March 31, 1935
10829 Rollandia
30 Polypodium tamariscinum
31 Antidesma platyphylla
32 Asplenium horridum
33 Doodya kunthiana
34 Gahnia
35 Dodonaea viscosa
36 Gouldia terminalis var. macrothyrsa
37 Acacia koa
38 Gleichenia linearis
39 Gleichenia
40 Nephrolepis ~~exaltata~~ cordifolia
41 Polypodium sarmentosum

10842 Stenolema chinensis
10843 ~~Baccharis~~ Honaliodendron flabellatum (Dicks & Smith) F. Fisch.
10844 Maisacus angustifolia
45 Styphelia tameiameia
46 Asplenium caudatum
47 Gleichenia
48 Athyrium pectinatum
49 ~~Hedyotis~~ Schlechtendahlia sp. cordata v. cordata
50 Pipturus
51 Asplenium
52 ~~Hedyotis~~ Schlechtendahlia sp. cordata var. cordata
53 Cyperus
54 Gouldia terminalis var. kaala f. subcaala
55 Coprosma
56 Clermontia oblongifolia
57 Ladleria
58 Asplenium unilaterale
59 Trichomanes
60 Phyllostegia grandiflora
61 Alsinidendron trinerve
62 Rollandia
63 Phyllostegia hirsuta
64 Ilex sandwicensis
65 Trematolobelia
66 Phyllostegia glabra var. macraei
67 ~~Hedyotis~~ Schlechtendahlia var. laevis f. glomerata
68 Pelea clusiaefolia Gray var. acuminata St. John (?)
69 Luttonia
70 Gouldia terminalis var. kaala f. subcaala
71 Coprosma longifolia
72 Ilex sandwicensis
73 Ilex sandwicensis
74 Straussia
75 Embelia pacifica

10847a Metrosideros

10876 Korthalsella complanata ~~platycaula~~
77 Panicum
78 Pteridium aquilinum
79 Polypodium pellucidum
80 Sideroxylon
81 Eragrostis grandis var. polyantha
82 Lycopodium serratum
83 Stenogyne kaalae
84 Bidens

Summit of Puu Kaala, ~~Waiane~~ west side. III/31/1935

85 Lycopodium polytrichoides
86 Phyllostegia lantanoides

South side Makaha Valley, near head. III/31/1935

87 Straussia
88 Asplenium
89 Euphorbia hillebrandii
90 Gouldia terminalis var. macrothyrsa.
91 Panicum
92 Gouldia terminalis var. macrothyrsa
93 Carex brunnea
94 Gouldia

Bottom of Makaha Valley III/31/1935

95 Elephantopus spicatus

Waikane - Schofield Trail, Kahana, 740 m. alt. V/12/1935

d. Sherff 96 Labordia fagraeoides var. Humei Sherff

Kalihi Road, Honolulu, May 24, 1935

10897
10898 Eugenia uniflora
10899

Ulapau Head, Mokapu Peninsula
Oahu, May 26, 1935

10900 Xanthium
10901 ~~Pi~~dium Reichardia tingitana
10902 Jaquemontia sandwicensis
10903 Heliotropium curassavicum
10904 Boerhaavia diffusa
10905 Cenchrus didymus
10906 Scaevola frutescens
10907 Batis maritima

Nuuanu Valley, Honolulu, May 27, 1935

10908 Pongamia pinnata

Lanikai, Kailua, June 2, 1935

10910 Vitex Negundo var. cannabifolia (Sieb. & Zucc.) Hand.-Mazz.

Kailua Park, Kailua, June 2, 1935

10911 Casuarina equisetifolia
10912 Casuarina equisetifolia

Honolulu University Campus,
June 5, 1935

10913 Cedrela
10914 Phytolacca dioica
10915 Hernitiera littoralis

June 17, 1935

10916 Bunchosia americana
10917 ~~Serjania~~

Kealakipapa Valley,
Maunalua, June 27, 1935

10918 Cucumis
10919 Myoporum sandwicense
10920 Tribulus cistoides
10921 Gossypium tomentosum
~~10922 Santalaceae~~

Rocky flats near Makapuu Head,
Waimanalo, June 27, 1935

10922 Santalum

Waimanalo, June 27, 1935

10923 Lagenaria

Waimanalo Plantation, June 27, 1935

10924 Lida
10925 Chloris radiata
10926 Echinochloa crus-pavonis

Near Waimanalo Junction, Kailua
June 28, 1935

10927 Amaranthus
10928

Nuuanu Valley, Honolulu, June 28, 1935

29 Sterculia acerifolia

Palawai Gulch, Waianae Mts.
Honouliuli, June 30, 1935

30 Osmanthus sandwicensis
31 Plumbago zeylanica
32 Antidesma pulvinatum

Forest Reserve House, s.e. of Palikea,
Waianae Mts. Honoulinli, June 30, 1935
10933 Antidesma platyphyllum

Ridge above Forest Reserve House,
s.e. of Palikea, Waianae Mts. Honoulinli
June 30, 1935
34 Gouldia terminalis, var. kaala, f. Russii
35 Suttonia
36 Pelea oahuensis H. Leveille
37 Korthalsella complanata
38 Straussia
39 Gouldia terminalis, var. macrothyrsa X
G. terminalis, var. kaala, f. Russii.
40 Xanthoxylum
41 Gouldia terminalis, var. macrothyrsa
X G. terminalis, var. kaala, f. Russii
42 Liparis sandvicensis
43 Astelia
44 Scaevola

Near summit of Palikea,
Waianae Mts. Honoulinli, June 30, 1935
45 Nerandia Pelea oahuensis H. Leveille
46 Phytolacca
47 Cyrtandra Pickeringii
48 Gnaphalium purpureum
49 Pelea oahuensis H. Leveille, det. B.C. Stone, 1967
50 Suttonia
51 Bidens
52 ~~Hedyotis Schlechtendahliana~~ ssp. cordata, var. secunda flora Fosberg
53 Straussia
54 Cyrtandra
55 Ilex

Gulch above Kupehau, near head,
Waianae Mts. Honoulinli, June 30, 1935
with O. Degener.
10956 Urera kaalae
57 Rumex

Main divide north of Palikea,
Waianae Mts. Honoulinli, June 30, 1935
58 Viola trachelifolia
59 Elaeocarpus bifidus
60 Coprosma longifolia
61 Eragrostis grandis
62 Vaccinium dentatum
63 Gouldia terminalis, var. macrothyrsa
64 Clermontia
65 Labordea molokaiana var. Bryanii Sherff (Sherff) det. Sherff
66 Suttonia
67 Exocarpus
68 Scaevola gaudichaudiana

Ridge above Kupehau, Waianae
Mts. Honoulinli, June 30, 1935
69 Antidesma platyphyllum
70 Pittosporum
71 Psilotum complanatum
72 ~~Hedyotis Schlechtendahliana~~ ssp. cordata, var. secundiflora, f. Little
~~73 Antidesma platyphyllum~~
73 Suttonia
74 Wikstroemia
75 Korthalsella cylindrica
76 Gouldia terminalis, var. macrothyrsa X
G. terminalis, var. kaala, f. Russii
77 ~~Wikstroemia~~
78 Suttonia sandwiceneis

10979 Luttonia
80 Charpentiera
81 Gouldia terminalis, var. kaala, f. Russii
82 Straussia
83 Exocarpus
84 Viola trachelifolia
85 Dianella
84 ~~Pteridium aquilinum~~
86 Eugenia sandwicensis
87 ~~Cuth~~ Pteridium aquilinum
88 Eragrostis grandis
89 Tetramolopium polyphyllum
90 Cocculus
91 Luttonia
92 Leheidea
93 Bidens
94 Chenopodium sandwicheum
95 Eugenia rariflora
96 Santalum ellipticum
97 Gnaphalium

Honolulu, U. of H. campus, July 1, 1935

98

99 Zebrina pendula

1 200

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